



Western Loudoun Gap Analysis and Feasibility Study

Potomac Heritage National Scenic Trail

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ACKNOWLEDGMENTS

Key Partners (Primary Stakeholders):

- Loudoun County Department of Parks, Recreation, and Community Services
- National Park Service
- Northern Virginia Regional Commission

Management Partners (Secondary Stakeholders):

- Harpers Ferry National Historical Park
- Town of Leesburg
- Loudoun County Department of Transportation and Capital Infrastructure
- NOVA Parks
- Sweet Run State Park
- Virginia Department of Transportation
- Lakes at Red Rock HOA

Community Stakeholders:

- Piedmont Environmental Council
- Old Dominion Land Conservancy
- Loudoun County Rural Economic Development Council
- Potomac Heritage Trail Association
- US Trail Ride

Thank you to those that attended either or both of the public workshops in Lucketts or Leesburg for contributing ideas and providing additional comments and suggestions.

List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway Transportation Officials
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
BOS	Board of Supervisors
C&O	Chesapeake and Ohio
CIP	Capital Improvement Plan
CRPI	Cultural Resource Preservation Index
DHR	Department of Historic Resources
DTCI	Department of Transportation and Capital Infrastructure
HAFE	Harpers Ferry Office of National Park Service
HOA	Homeowners Association
LARR	Lakes at Red Rock (HOA)
LPAT	Linear Parks and Trails
MARC	Maryland Area Rail Commuter
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NTS	National Trail System
NVRC	Northern Virginia Regional Commission
PHNST	Potomac Heritage National Scenic Trail
POHE	NPS Office Responsible for Managing PHNST
POR	Point of Rocks
PRCS	Parks, Recreation, and Community Services
ROW	Right-of-Way
RSCS	River and Stream Corridor Resources
SHA	Maryland State Highway Administration
TPC	Trail Planning Committee
VaNLA	Virginia Natural Landscape Assessment
VDCR	Virginia Department of Conservation and Recreation
VDOT	Virginia Department of Transportation

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EXECUTIVE SUMMARY

The study identifies the most feasible route options for completing a gap in the Potomac Heritage National Scenic Trail (PHNST) in Loudoun County, Virginia from the Town of Leesburg westward. A connection to the Appalachian Trail and C&O Canal Trail is a desirable result of the project.

The study identifies potential routes that are considered eligible for designation as a National Scenic Trail (NST) and that link together public lands along the Potomac River utilizing primarily existing low volume and unpaved roads. The study then evaluates the routes based on four categories of criteria: trail experience issues, natural/cultural resource issues, functional issues, and trail sustainability/management issues.

The study was developed and managed through a partnership between the National Park Service (NPS), Loudoun County's Department of Parks, Recreation, and Community Services (PRCS), and the Northern Virginia Regional Commission (NVRC). The project was managed by NVRC and the planning team was led by Lardner/Klein Landscape Architects.

The study was a collaborative effort guided by existing local, state, and federal plans and policies, public input, and stakeholder meetings. The project was based on existing and available data including geo-spatial (GIS) resources and recent related studies prepared through prior efforts of the NVRC, Loudoun County and NPS.

The feasibility for extending the National Scenic Trail (NST) network to Harpers Ferry starts with corridors along the Potomac River identified as part of Loudoun County's Linear Parks and Trails (LPAT) plan.

Loudoun County's County-wide Transportation Bicycle and Pedestrian Plan Map provided additional basis for helping to make some of the network connections across and along some of the busier roads, where needed.

From this foundation, the planning team identified public lands and river access points that could be linked together utilizing LPAT corridors and additional low volume and gravel roads forming a route as close as possible to the Potomac River – identified on Map 1 on page vi as the “blue route.”

In some cases, alternative, more inland routes were needed to make further connections where gaps were found between the low volume/unpaved roads and public parkland.



Figure 1 Potomac River as seen from Devils Elbow

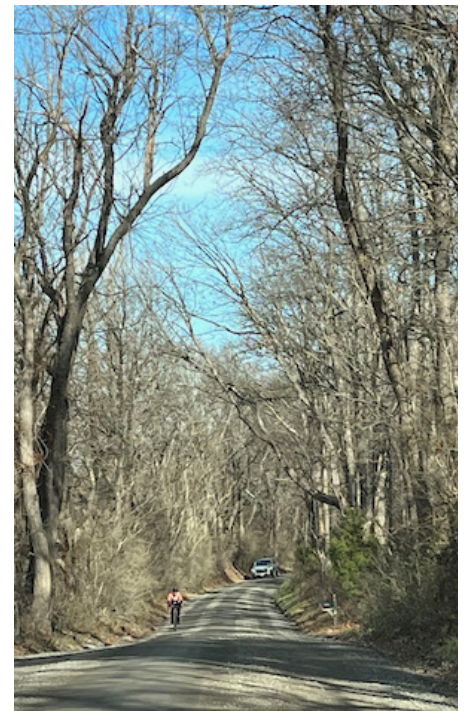
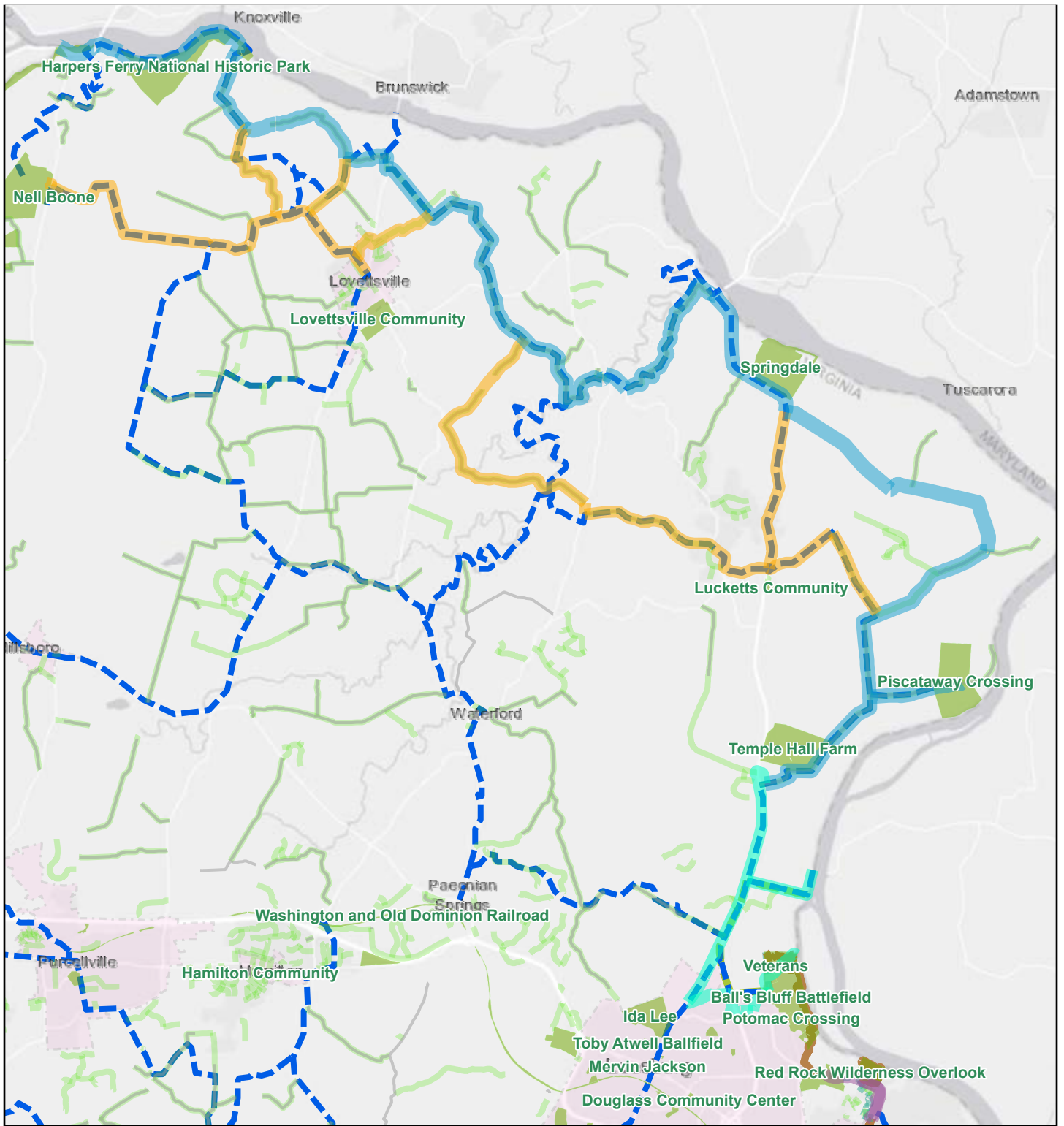
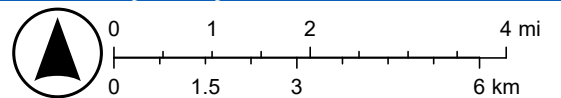


Figure 2 Low volume gravel road north of Leesburg

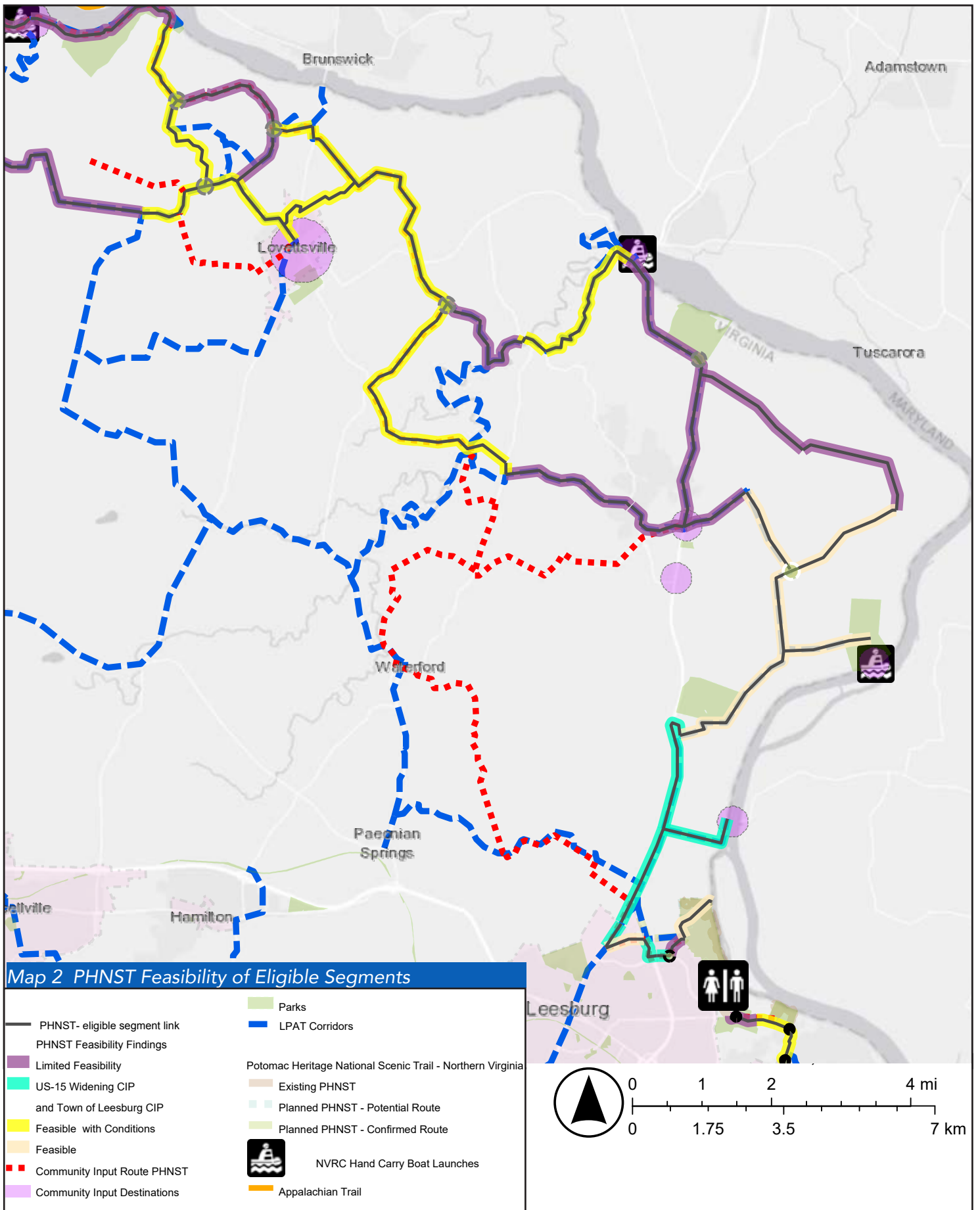


Map 1 PHNST Eligible Route Segments Considered as Part of the Feasibility Study

- Light Gray Canvas Reference
- PHNST_RouteCriteriaFeasibility_11212024
- Blue Route
- Yellow-Orange Route
- US-15 Widening/Leesburg
- Leesburg/South of Leesburg
- VDOT Unpaved Roads
- VDOT Traffic Volume -
- Parks
- LPAT Corridors
- Potomac Heritage National Scenic Trail - Northern Virginia - Trail Planning Status
- Existing PHNST
- Planned PHNST - Potential Route
- Planned PHNST - Confirmed Route
- Light Gray Canvas Base



Esri, HERE, NPS, Esri, HERE, Garmin, USGS, EPA, NPS



The river and inland routes were then evaluated using a link and node system to compare the feasibility of route segments (links) between established and identified nodes (control points) at fixed locations that the overall trail route must pass through (such as an existing bridge, a common intersection, or a desired destination). Three levels of feasibility were identified for all evaluated segments:

- **Limited feasibility:** segments with issues that must be addressed prior to moving forward
- **Feasible but with condition(s):** segments with issues that can be resolved through more creative design, engineering and management efforts
- **Feasible:** segments with issues that can be resolved with standard trail design practices – whether an on-road route or an overland route



Figure 3 Example of feasible segment utilizing Dry Hollow Road



Figure 4 Example of segment with limited feasibility along Edwards Ferry Road at Red Rock Overlook Regional Park

Findings indicated that a westward extension of the Potomac Heritage National Scenic Trail along identified link segments is feasible, but with varying degrees of feasibility (as shown on Map 2 on page vii).

The feasibility study evaluated trail corridors on public land and for a limited number of overland routes that were included as part of the LPAT plan. Overland routes included in the LPAT Plan will continue to require further collaboration with private landowners or other agency land managers. Potential overland routes not included in the LPAT plan, but connecting Potomac River access points were not considered directly as part of the feasibility study, but were shown generally on feasibility summary maps. Pending future discussions and agreements with private landowners, overland route segments could be considered as a means of overcoming routes having limited feasibility (such as avoiding on road routes with higher traffic volumes and/or operating speeds).

Following completion of the study, NVRC and the primary project partners will coordinate on additional outreach and engagement around the study's findings. Results of the study present the feasibility of potential routes within the PHNST corridor, including considerations for routes that have limited feasibility or are unfeasible, but these findings primarily represent a starting point for future planning efforts for trail designation.

NVRC will continue to coordinate with Loudoun County and the National Park Service to determine a connected trail route for the region. However, the timeline will vary depending on several factors such as funding availability and landowner participation. While some sections can be completed as ongoing Loudoun LPAT capital improvement projects, other sections could take many years for development due to the lengthy process of working collaboratively with private landowners and public land managers, as well as developing more complex design and engineering plans.

INTRODUCTION

THE POTOMAC HERITAGE NATIONAL SCENIC TRAIL

From the mouth of the Potomac River at the Chesapeake Bay to the Allegheny Highlands of Pennsylvania, the Potomac Heritage National Scenic Trail offers a rich variety of land and waterscapes.



Figure 5 View from Red Rock Wilderness Overlook Park (photo courtesy of NOVA Parks)

The National Scenic Trail incorporates more than 900 miles of existing and planned trails managed by federal, state, local and non-profit entities. The entire route is shown in Figure 6. Detailed information is found at www.nps.gov/pohe.

PURPOSE OF THE FEASIBILITY STUDY

The study identifies the most feasible route options for completing a gap in the Potomac Heritage National Scenic Trail (PHNST) in Loudoun County, Virginia. The gap is located between Northlake Boulevard just northeast of Leesburg and Harpers Ferry on the Virginia side of the Potomac River. Connections to the Appalachian Trail and C&O Canal are a desirable result of the project.

The project is a partnership between the Northern Virginia Regional Commission, Loudoun County, and the National Park Service to identify, assess, and present the feasibility of potential routes in the PHNST corridor. Feasibility issues includes considerations for trail construction, maintenance, accessibility, park connections, scenic views, and other key elements for trail development.

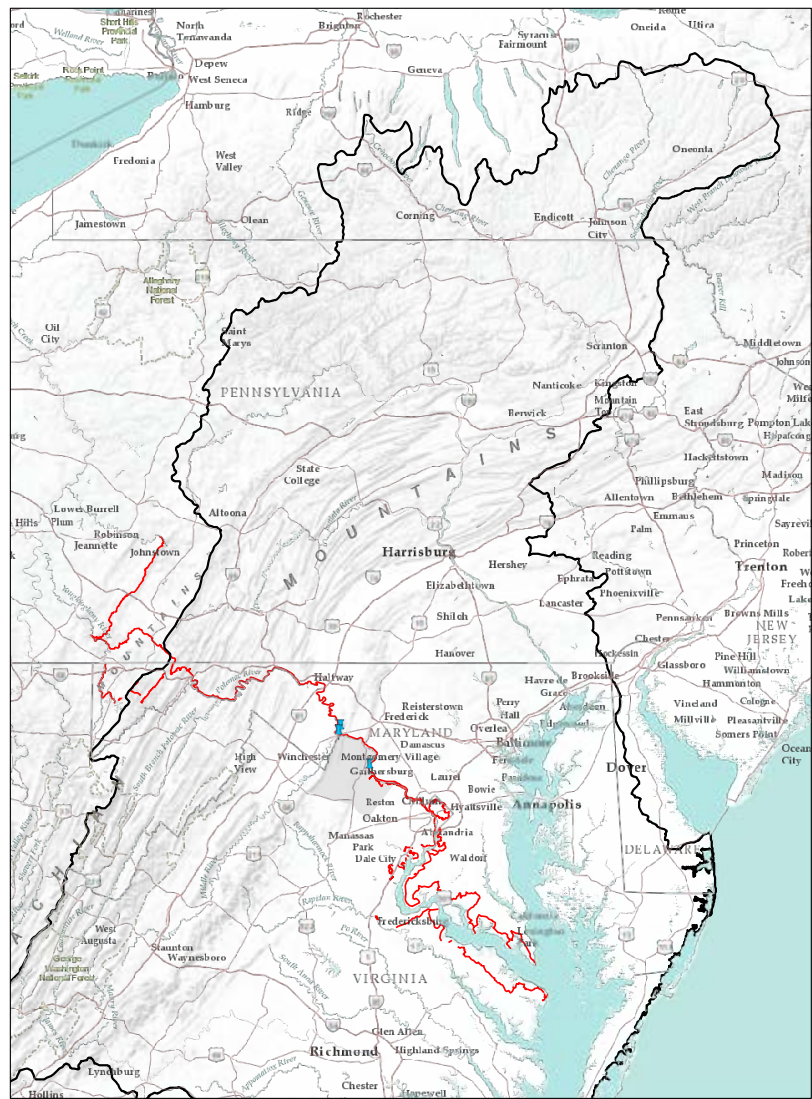


Figure 6 Potomac Heritage National Scenic Trail from Pennsylvania's Allegheny Highlands to the Mouth of the Potomac River



Figure 7 The trail network is intended for non-motorized modes of travel including foot, bicycle, boat, horse and cross-country.

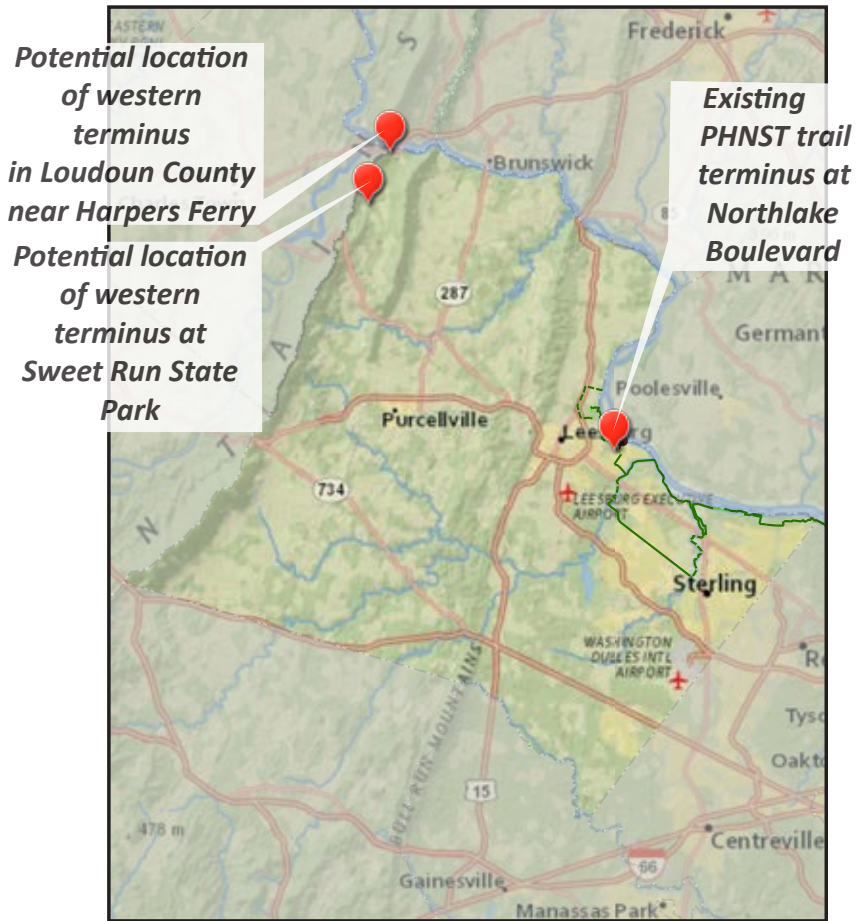


Figure 8 Location Map

ROLE OF THE NATIONAL PARK SERVICE

- Administers the federal interest in the National Scenic Trail
- Enters into General Agreement (GA) agreements with States, local governments, private organizations, and individuals for the use of lands for National Scenic Trail designations

The National Trail System (NTS) was established through enactment of the National Trail System Act of 1968 (82 Stat. 919, Public Law 90-543) (the Act). The legislation also authorized “feasibility studies” for additional components of the NTS, including the Potomac Heritage Trail. One such study was completed in 1974 by the Department of Interior’s Bureau of Outdoor Recreation (this was later incorporated into the National Park Service). A 1983 amendment to the Act (77 Stat. 43, Public Law 90-543) designated the Potomac Heritage National Scenic Trail (“the Trail” or PHNST) as a component of the NTS, recognized a corridor for the Trail, and assigned administration of the federal interest in the Trail to the Secretary of the Interior, which role is delegated to the National Park Service (NPS) to “enter into such agreements with landowners, States, local governments, private organizations, and individuals for the use of lands for trail purposes.”

The NPS long term vision for the National Scenic Trail is to locate the PHNST as close to the river as possible.

ROLE OF NORTHERN VIRGINIA REGIONAL COMMISSION

- The lead agency and manager of the study
- Provides planning and management for the Northern Virginia section of the PHNST

The Northern Virginia Regional Commission (NVRC) is a regional council of 13 local governments in the Northern Virginia suburbs of Washington D.C., representing one of 21 planning districts that serve the Commonwealth of Virginia. According to Virginia's Regional Cooperation Act, NVRC is a political subdivision (a government agency) within the Commonwealth. Commissioners are appointed by and from the governing bodies of NVRC's member localities on a population-based representation formula.

NVRC has provided planning and management for the Northern Virginia section of the PHNST since the 1990s, including coordination efforts prior to Congressional designation. NVRC currently supports the PHNST through a cooperative agreement with the National Park Service and ongoing collaboration with PHNST management stakeholders, advocates, and other regional trail groups. NVRC staff lead trail data and mapping activities, special studies, and sponsor enhancement grant funding for trail construction activities in several jurisdictions.

ROLE OF LOUDOUN COUNTY

- Local government partner through the Department of Parks, Recreation, and Community Services
- Coordinate public access to trail facilities

Loudoun County's Department of Parks, Recreation, and Community Services (PRCS)

PRCS is responsible for implementing the recommendations from the Loudoun County's Linear Parks and Trails System Plan (LPAT). The LPAT, adopted July 6, 2021 (amended in October 2021) is described as "a roadmap for the County and its partners to build out an interconnected system that protects natural and cultural resources, honors Loudoun County's unique sense of place, and connects residents to each other."

As a long term goal, PRCS envisions the PHNST as a primarily natural surface trail aligned as close to the river as possible. LPAT identifies general trail corridors that will comprise the backbone of the PHNST. Many of these corridors utilize existing low volume gravel roads in the near term.

The LPAT framework plan corridors form the basis for route segments being considered for the PHNST. Existing low volume gravel roads closest to the river as identified in the LPAT framework plan are the starting point for a "river option" that is highlighted in blue in Figure 10 on page 4. In



Figure 9 Potential route segments for the PHNST provide views and access to the Potomac River and its tributaries

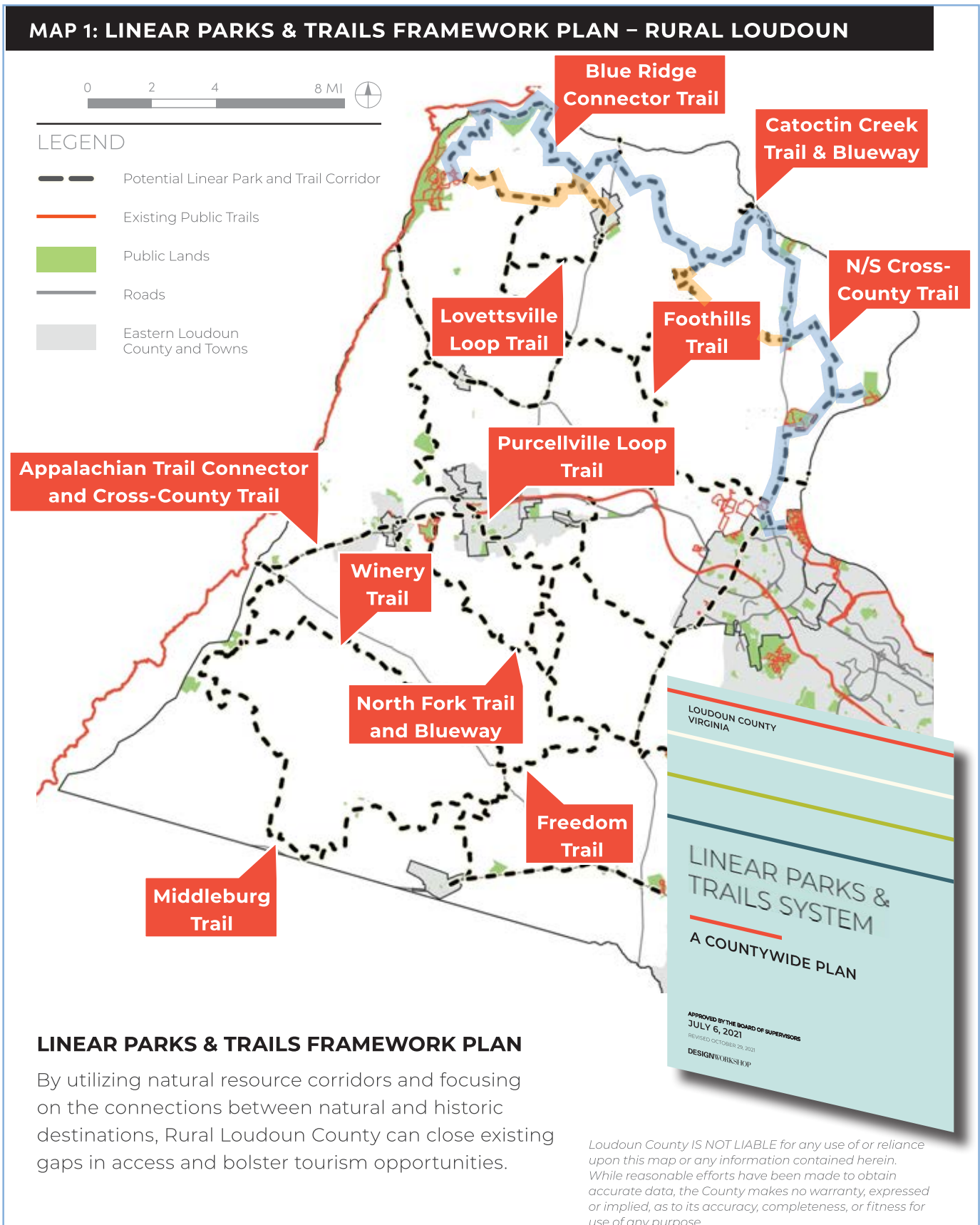


Figure 10 Excerpt from Loudoun County's Linear Parks and Trails Plan, as amended (October 2021) with planned trails close to the Potomac River (highlighted in this graphic for clarity)

addition portions of the LPAT corridors form an alternate inland route (highlighted in orange in Figure 10 on page 4. The LPAT corridors forming the basis for the PHNST's routing options include the following:

- North-South Cross-County Trail, which follows US 15 between Leesburg and Point of Rocks, with a deviation between Temple Hall Farm and Stumptown Road that takes the corridor along lower-traffic roads and provides access to Piscataway Crossing Regional Park.
- Catoctin Creek Trail & Blueway, which runs between the US 15 and VA 287 bridge crossing of the Potomac River along Furnace Mountain, Downey Mill, Quarter Branch, and Wenner Roads. This is the same path as the PHNST River Option through this part of the County.
- Blue Ridge Connector Trail, which connects the VA 287 and US 340 crossings of the Potomac River. This corridor segment overlaps with the PHNST River Option along portions of Tollhouse and George's Mill Roads.
- East and west of Lucketts, the PHNST Inland Option is aligned with LPAT corridors on Chapel Road and Bald Hill Road.
- West of Lovettsville, the PHNST Inland Option shares Irish Corner Road with another LPAT corridor.

These co-located segments of the PHNST strengthens the overall impetus behind the development of protected paths in these corridors.

The LPAT also establishes a set of design guidelines and typical cross-sections for all LPAT segments, which can serve as guidance for the design of PHNST segments down the road. Two designs (wide corridor and narrow) are set up as optimal cross-sections for western Loudoun County, along with various cross-sections that apply county-wide in conditions such as riparian buffers, steep slopes or protection zones. The only additional requirements for trails along roadways are an 8' buffer from the roadway and additional vertical clearance if the trail accommodates equestrians.

Loudoun County Department of Transportation and Capital Infrastructure (DTCI)

DTCI is responsible for bicycle and pedestrian infrastructure as part of Loudoun County's transportation system, primarily along existing and planned roadways. Improvements are planned as part of the Loudoun County Master Transportation Plan

The 2019 Loudoun Countywide Transportation Plan (Figure 11 on page 6) and its ongoing amendments calls for a shared-use path along one side of US 15 from Leesburg to Point of Rocks, continuing along Lovettsville Road to the Town of Lovettsville, and on Berlin Turnpike between Lovettsville and the VA 287 bridge. Irish Corner Road, another potential PHNST segment, is listed as a shared roadway within the overall County bicycle network.

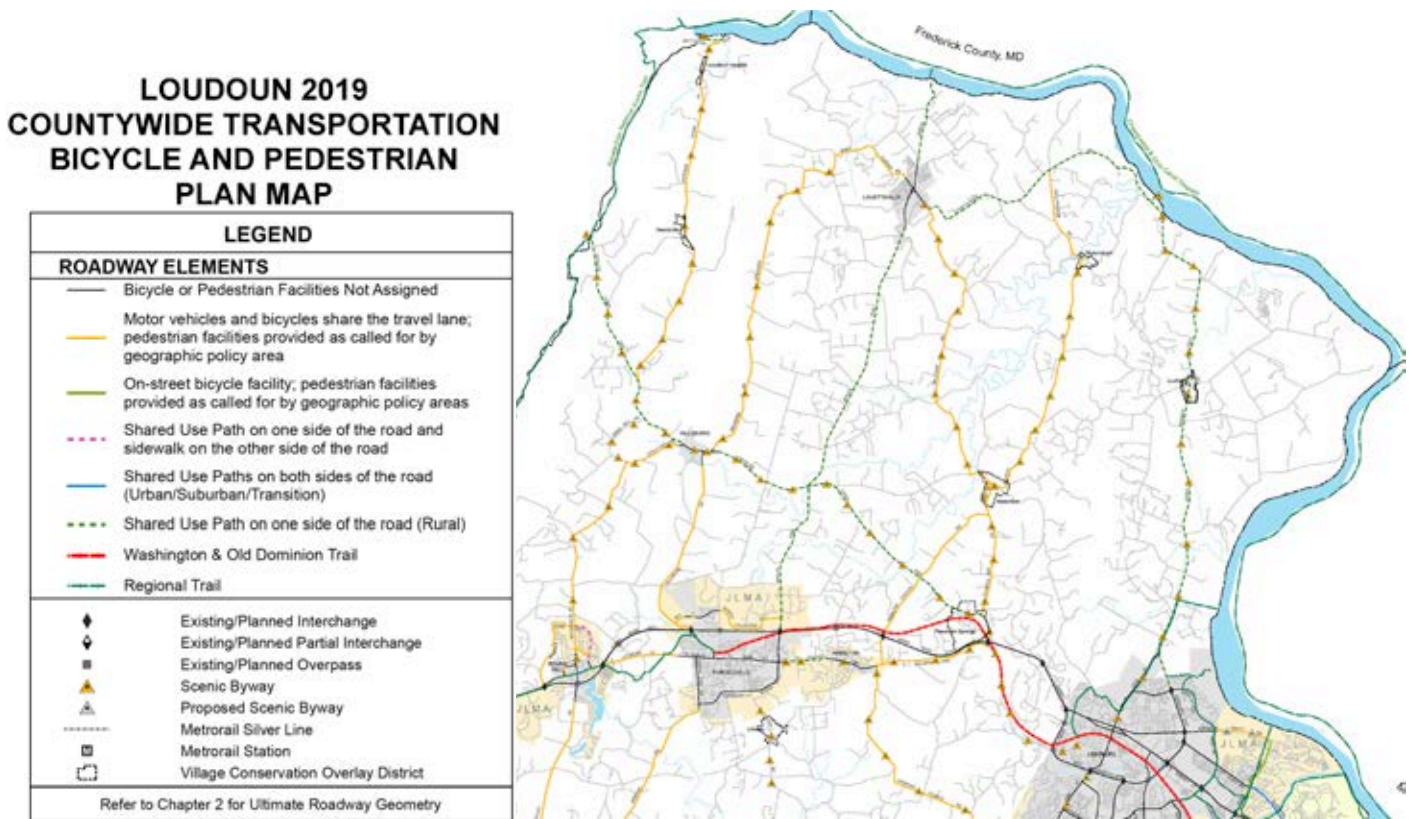


Figure 11 Excerpt from Loudoun 2019 Countywide Transportation Bicycle and Pedestrian Plan Map (as amended through 2/7/2023)

Transportation CIP (Capital Improvement Projects) funded within the corridor

Many Loudoun County projects are in the CIP over a six-year period (FY2025-FY2030) and can have an impact on the feasibility of the PHNST potential alignment. The CIP only requires appropriation of funds for the adopted fiscal year, FY 2025. Subsequent years only contain planned funding that should be considered in later appropriations and budgets. The CIP projects should be envisioned as to how advanced they are in the six-year period and whether there are still opportunities to coordinate the PHNST and the CIP projects. If the projects are in an advanced state, the PHNST alignment may need to assume a fixed CIP project location and functionality.

The most significant impact on the PHNST Corridor from the CIP Projects included in the FY 2025 Adopted Budget, adopted by the Board of Supervisors on April 2, 2024, are related to improvements along US 15:

- Previously Authorized Projects
 - **US 15 Widening, Battlefield Parkway to Whites Ferry Road (C02212)** – The project provides for the planning, design, ROW acquisition, and widening of US 15 from two to four lanes from Battlefield Parkway in the Town of Leesburg to Whites Ferry Road.
- Projects Identified for Future Development
 - **US 15 Improvements, Montesor to Point of Rocks, Phases 4 to 7** – This project provides for the design, right-of-way acquisition, and widening of US 15 from two to four lanes from Whites Ferry Road to Montesor Road (Route 661). The scope of work also includes the construction of a four-legged roundabout at Montesor Road (Figure 12) with a realigned Limestone School Road, **a shared-use path along the west side of US 15, and a shared use path along the north side of Whites Ferry Road from US 15 to the ferry landing.** The scope of work and budget for this project was originally included in the FY 2023 CIP project

entitled US 15 Widening - Battlefield Parkway to Montresor Road. During the FY 2024 CIP budget development process, the project was re-segmented to more effectively administer the project and the planned funding that made up the project budget was reallocated to align the budgets for the newly created segments. The project's budget was increased during the FY 2025 CIP budget development process based on the most recent cost estimate.

- Scheduled Appropriations in FY2025
 - **US 15 Widening, Whites Ferry to Montresor Road (\$5.924 M)**
- **US 15/Spinks Ferry Road (C02300)** – This project provides for the design, right-of way acquisition, utility relocation, and construction of a roundabout at the intersection of US 15 with Spinks Ferry Road and a realigned Newvalley Church Road. The scope of work and budget for this project was originally included in the FY 2021 CIP project entitled US 15 Montresor Road and Point of Rocks Bridge Improvements. The project was segmented to more effectively administer and deliver incremental improvements sooner. The project name was changed from US 15 Improvements: Montresor to Point of Rocks, Phase 1 to US 15/Spinks Ferry Road/Newvalley Church Road Roundabout during the FY 2024 CIP budget development process.
- **US 15/Lovettsville Road Intersection Improvement (C02360)** – This project provides for the planning, design, right-of-way acquisition, and construction of intersection improvements on US 15 at Lovettsville Road. The scope of work includes roadway, turn lane, and shoulder widening to improve safety and traffic operations at the intersection. The scope of work and budget for this project was originally included in the FY 2021 CIP project entitled US 15 Montresor Road and Point of Rocks Bridge - Improvements. As part of the FY2022 CIP budget development process, the project was segmented to effectively administer the project and deliver incremental improvements sooner. The project name was changed from US 15 Improvements: Montresor to Point of Rocks, Phase 2 to US 15/Lovettsville Road Intersection Improvement during the FY 2024 CIP budget development process. The project's budget was increased during the FY 2025 CIP budget development process based on the most recent cost estimate.
- **US 15 Lucketts Bypass (C02559)** – This project provides for the planning, design, right-of-way acquisition, utility relocation and construction of a new segment of US 15 around the west side of the Village of Lucketts that will consist of a four-lane median divided roadway south of Stumptown Road/Lucketts Road. To the north of the Stumptown Road/ Lucketts Road intersection, the roadway will transition to a two-lane median divided roadway. **The project includes a shared use path**

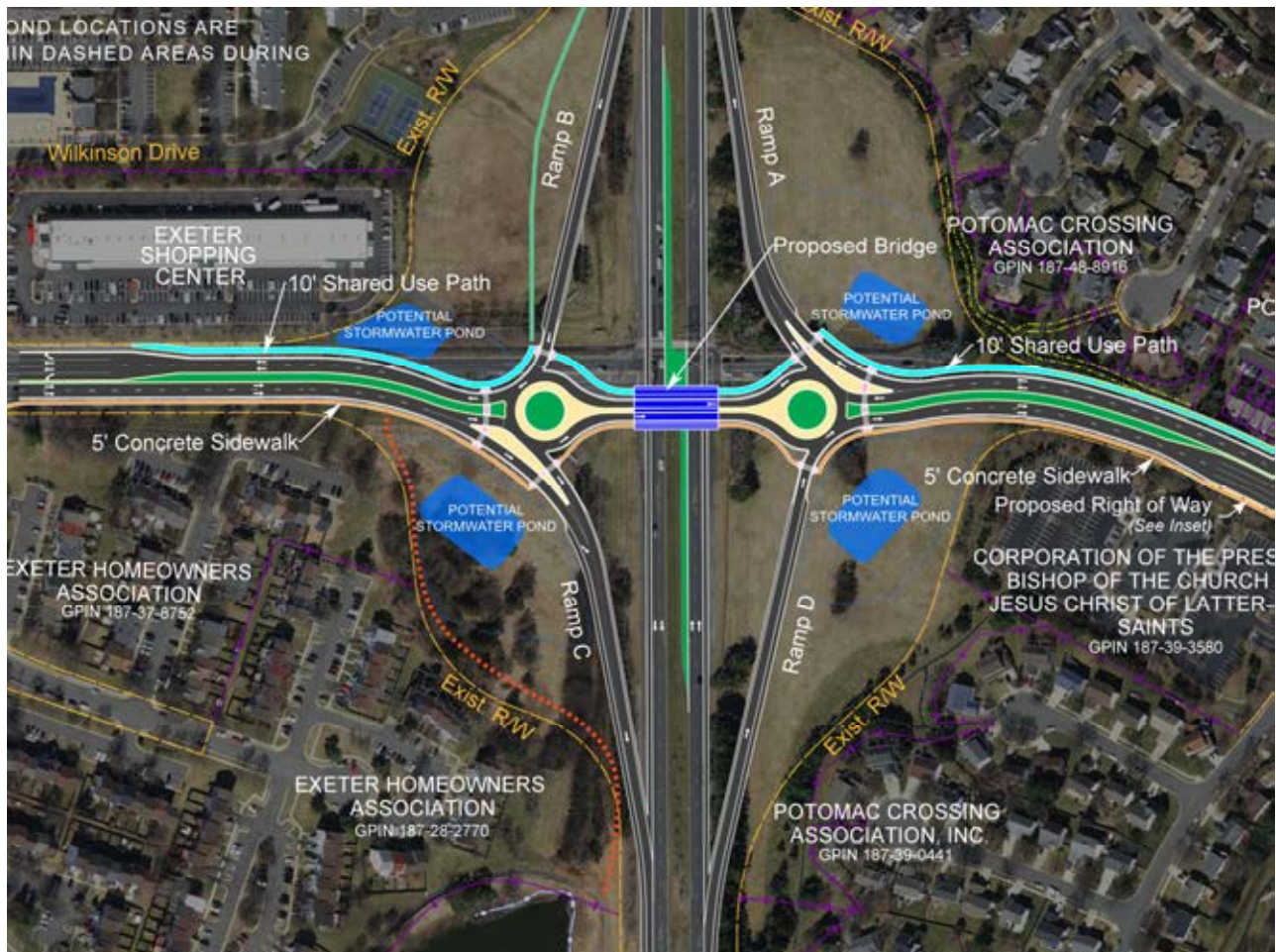


Figure 12 Concept design for proposed roundabout at Montresor Road with connecting to Limestone School Road

located along the southbound lane(s) of the bypass. The scope of work and budget for this project was originally included in the FY 2021 CIP project entitled US 15 Montresor Road and Point of Rocks Bridge - Improvements. As part of the FY 2022 CIP budget development process, the project was segmented to effectively administer the project and deliver incremental improvements sooner. The segment associated with this scope of work was named US 15 Improvements: Montresor to Point of Rocks, Phase 3, and the project was moved to the Projects Identified for Future Development section of the CIP during the FY 2023 CIP budget development process. The project name was changed from "US 15 Improvements: Montresor to Point of Rocks, Phase 3" to "US 15/Lucketts Bypass" during the FY 2024 CIP budget development process and moved from the Projects Identified for Future budget development process of the CIP into the six-year period.

Figure 13 Town of Leesburg approved route for the PHNST as part of the Battlefield Parkway overpass of the Leesburg Bypass

- **Bypass at Battlefield Parkway** – This project is being administered by the Virginia Department of Transportation (VDOT) on behalf of the Town of Leesburg. The Town of Leesburg has adopted a specific location for the PHNST to be incorporated into the project using a planned overpass on Battlefield Parkway (see Figure 13).



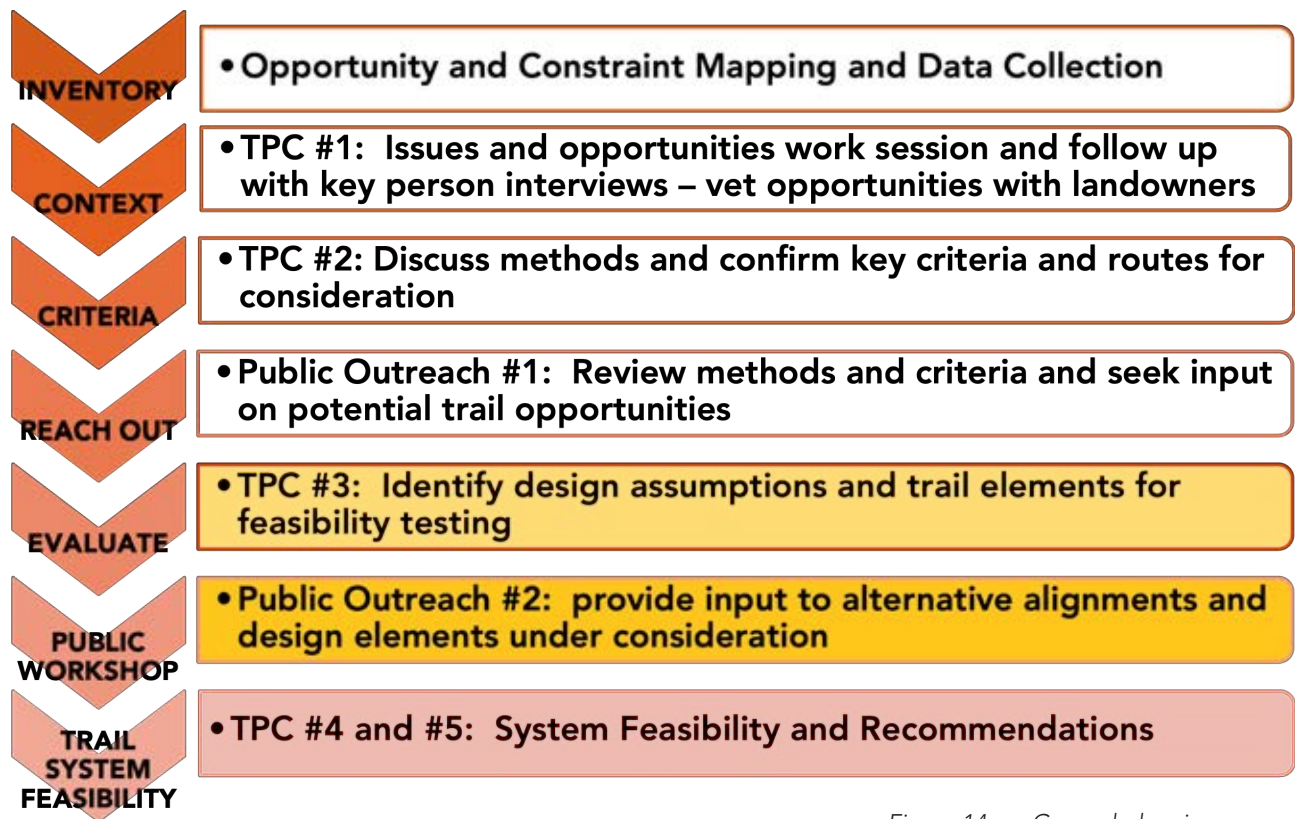


Figure 14 General planning process, trail planning committee (TPC) meetings, and public meetings conducted for the feasibility study

PLANNING PROCESS

The Northern Virginia Regional Commission, National Park Service and Loudoun County PRCS formed a core trail planning committee (TPC) to coordinate activities on the project and assure timely reviews of project deliverables. Stakeholder outreach was broken out into the three tiers based on their involvement in the potential trail corridor:

- **Key Partners (Tier 1):** This tier includes the National Park Service (NPS) POHE office, NVRC, and Loudoun County Parks and Recreation. These stakeholders provide administration of the project and serve as the leads for study development and management.
- **Management Partners (Tier 2):** This tier includes representatives from entities that own or manage land in the project corridor, such as Virginia Department of Transportation (VDOT), NPS trail and land units, the Town of Leesburg and other departments within Loudoun County government (including the office of the elected Board of Supervisors in the Catoctin and Leesburg Districts). These partners’ participation is essential to determining potential alignments of the trail through their properties. These partners took part in specific topical meetings to discuss primary components and alignment options for the PHNST.



Figure 15 Members of the core trail planning committee touring the Harpers Ferry Tract at the end of George's Mill Road

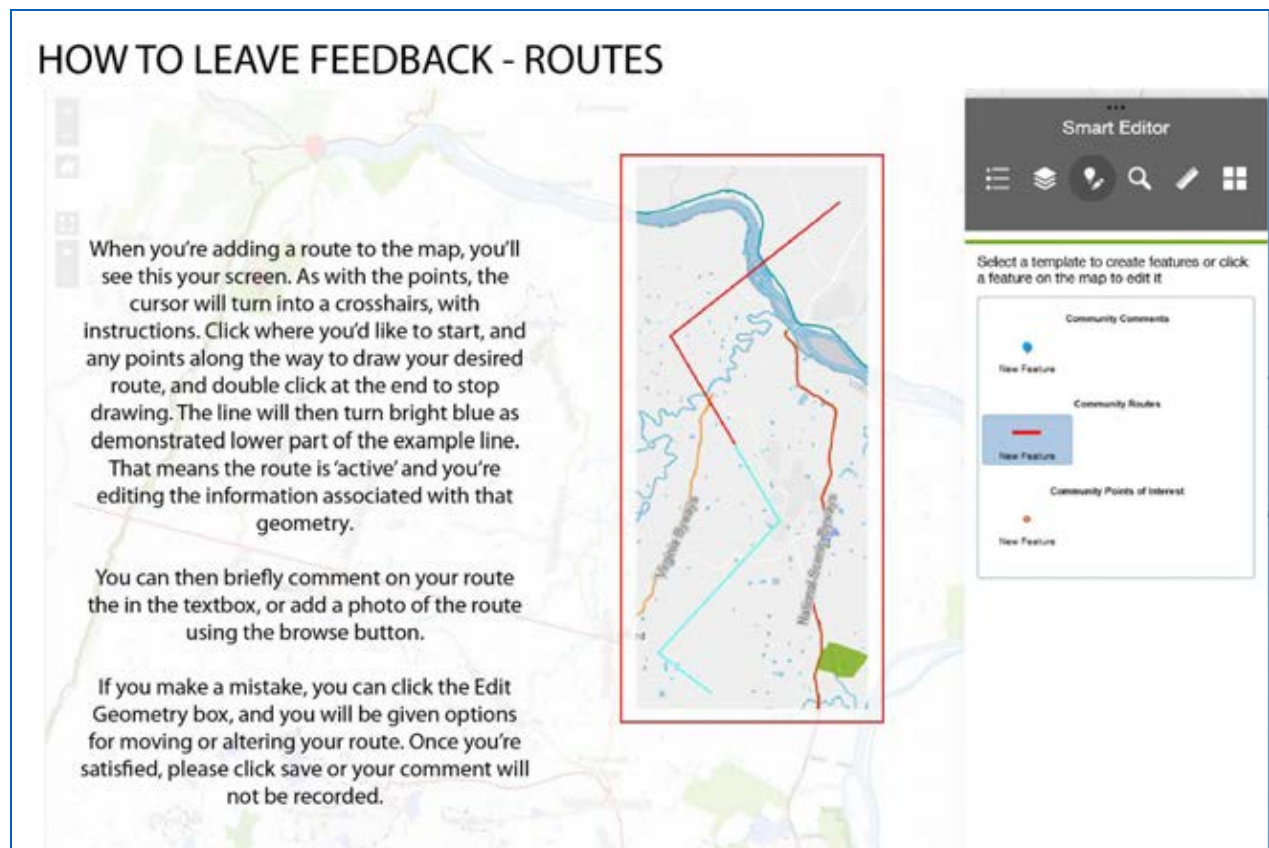


Figure 16 Displays were available for public review and comment explaining the feasibility study methods and results at the October 29, 2024 public meeting at the Ida Lee Recreation Center in Leesburg

- **Community Stakeholders (Tier 3):** This tier consists of representatives from groups and entities that do not own or manage land in the project corridor but have a role or interest in the PHNST or regional trail development and alignments. This includes non-profit organizations, such as the Potomac Heritage Trail Association (PHTA), Old Dominion Land Conservancy, and Bike Loudoun, as well as the Virginia DOT State Trails Office. Community Partners provided feedback and input on primary study products and outcomes.

The feasibility study was developed over an 11-month period:

- January-March 2024: Project kick-off with primary stakeholders.
- April-May 2024: Initial outreach to land management and community stakeholders, project scoping and methodology development.
- May 16, 2024: First public meeting hosted at Lucketts Community Center in Lucketts, VA from 6:00 pm - 8:00 pm. Informational map displays were available for informal review with the consulting firm and project partners followed by a brief presentation and discussion. Enlarged maps of the study area were plotted in three segments and arrayed on tables to capture location specific comments, trail routing ideas and other uses and concerns. A questionnaire was available until June 3, 2024 to provide additional opportunities for public feedback.
- May-July 2024: Initial methodologies were refined for feasibility testing based on stakeholder and public input.
- July-October 2024: Feasibility assessments were developed and further refined based on input from the core trail planning committee.
- October 29, 2024: NVRC and project partners hosted a public meeting on Tuesday from 6 – 8 PM at the Ida Lee Recreation Center in Leesburg, Virginia to offer the opportunity for community members to learn about and provide feedback on the initial results of the feasibility study. Informational displays and maps were available for informal review with the consulting team and project partners between 6 and 7 PM, followed by a brief presentation and discussion at 7 PM. There was also an option for remote participation during the meeting's presentation portion from 7 – 8 PM. Written and online comments were accepted until November 11, 2024. Feedback during this public meeting guided the refinement and finalization of the results from the study.
- November-December 2024: Report development and final revisions as needed to complete the study.



PUBLIC MEETING, QUESTIONNAIRE, AND STORY MAP

A brief questionnaire was provided before and after the May 2024 public meeting to provide another tool for the public to offer insights, comments and suggestions to the planning team, along with some information about how potential users might use the PHNST trail network if it were extended north and west of its current terminus in the Town of Leesburg. A Story Map application and a short questionnaire were made available a week in advance of the meeting and held open until June 3rd to record comments on potential destinations and routing ideas.

The following common themes emerged from the meeting to guide the next steps in the study process.

Short Hill Mountain

- The desirability of the river route around the tip of Short Hill Mountain (from George's Mill Road to the Adventure Center and Potoma Wayside connecting to Harpers Ferry) from a trail user's perspective was discussed extensively.
- Use of the former Appalachian Trail route as an option for routing was offered as a suggestion.
- The NPS concerns for such a route were noted by NPS staff as very significant (natural and cultural resource concerns as well as management considerations of an isolated trail area), but they would not rule it out at this time.

Figure 17 An on-line mapping tool was made available to make it easier for stakeholders to suggest routes and destinations

- An alternative to the Short Hill Mountain river route was discussed, going over Short Hill Mountain on private lands connecting to the transmission line corridor and in to Sweet Run State Park.

Loop route on both sides of the river

- The benefit of a route on both sides of the Potomac River between Harpers Ferry and Brunswick was noted by attendees. If the Short Hill Mountain segment could be built and an overland route along the shoreline could be obtained from a willing property owner, then a natural surface trail along the Potomac could be achieved for that section.

NPS management emphasis on public land

- The issue of whether NPS favored natural resource protection over recreation was raised along with the concern about potential conflicts between trail users and wildlife. The Loudoun County Linear Parks and Trails Plan (LPAT) contains a section on trail user/wildlife conflicts and management.

Consideration of a more inland and westerly route

- PHTA annotated the broader Context Map (display #2) to show a more inland and westerly route through Waterford that they would like to see considered for the PHNST (see “PHNST Community Suggested Routes and Destinations” on page 42 for more information).

Interest in bicycling on gravel roads

- Interest in using gravel roads for bicycling was noted. A local gravel road bicycling club was forming (but unable to attend due to their organizational meeting scheduled at the same time as the public meeting).

Feasibility study evaluation criteria

- Limited input was received on evaluation criteria that can be combined with responses to the questionnaire to develop suitable evaluation criteria for determining the feasibility of various routes. A follow-up comment was received noting that the criteria “proximity to the river” should be reconsidered to note whether the river can be seen from the trail or if a trail segment leads to public river access.

Questionnaire

A total of 52 questionnaires were completed to supplement the input gathered at the public meeting. The questionnaire, although not intended to be a statistically valid sample of the population, provided some key insights that can be utilized to better understand feasibility issues and concerns.

Key themes derived from the question regarding the respondents comfort level with varying types of trail conditions (Figure 18), ranging from completely separated from traffic on a natural surface to a hard surface and then to trail experiences that involve using the roadway shoulders or shared lanes, noted a clear preference from respondents for separated trail surfaces (either paved or unpaved). Low volume unpaved roads also stood out as very comfortable or somewhat comfortable.

Key themes derived from the question regarding issues of importance (Figure 19 on page 14) included:

- SAFETY: lengthen the trail to avoid areas with high traffic volumes and crash histories
- DESTINATIONS: prioritize linking to and from
- CONNECTIONS: natural surface trails that use and link public lands
- PROTECTION: lengthen the trail to avoid sensitive areas, etc.

The story map (Figure 17 on page 11) was also made available as part of the questionnaire providing an opportunity for

Q4: How comfortable would you be using the following types of trails if they were designated as part of the PHNST network in western Loudoun County?

Answered: 52 Skipped: 0

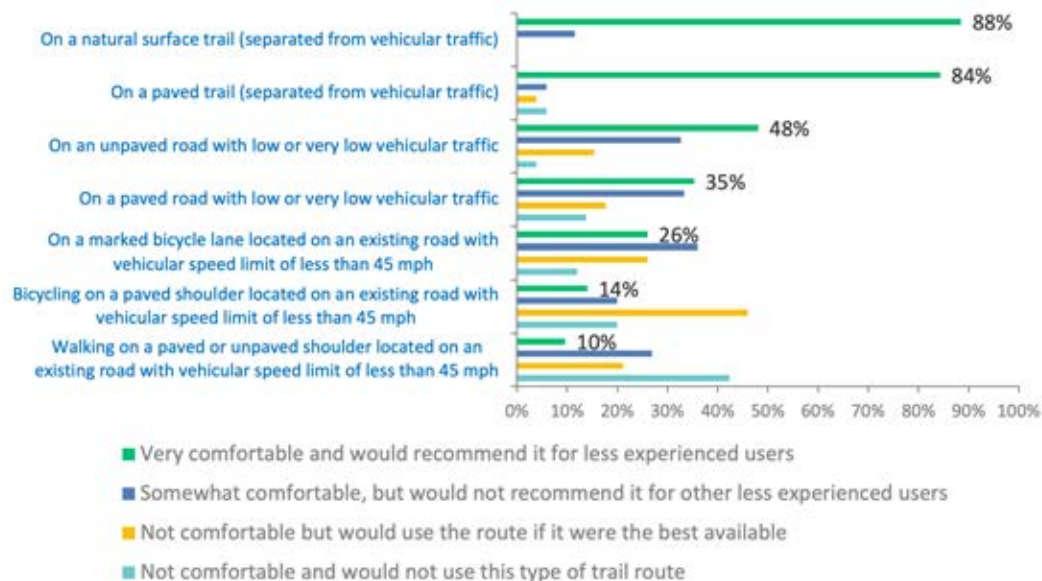


Figure 18 How comfortable would you be using the following types of trails if they were designated as part of the PHNST network in western Loudoun County?

Q5: Many issues and opportunities have been identified to date about the potential for extending the PHNST north and westward from Leesburg. Please indicate the relative level of importance of the following issues and opportunities. The trail should:



Figure 19 Results of questionnaire addressing issues of importance to respondents

respondents to identify specific routes that should be considered as part of the feasibility study. Map 13 on page 42 compares the routes suggested by the community (red dashed) with the route segment options included in the study.

INSIGHTS FROM INITIAL PUBLIC OUTREACH

Three key principles for locating feasible routes as derived from public outreach suggest that the routes should be located:

- As close to or associated with the Potomac River as possible.
- On public land or right-of-way.
- Should only utilize private land wherever a cooperative partnership can be established for trail development.

Portions of the community suggested routes are consistent with the route segments identified for further feasibility testing. However, the more inland and westerly route suggested by community stakeholders is similar to the LPAT Foothills Trail Corridor and therefore was not studied further. Using that route as an interim route would require similar levels of deed research, and would have to be heavily signed. The level of effort needed to make that route work as part of the PHNST, even on an interim basis would take away from the effort that should be applied to routes closer to the Potomac with similar issues. Further analysis of community suggested routes are included on page 41.

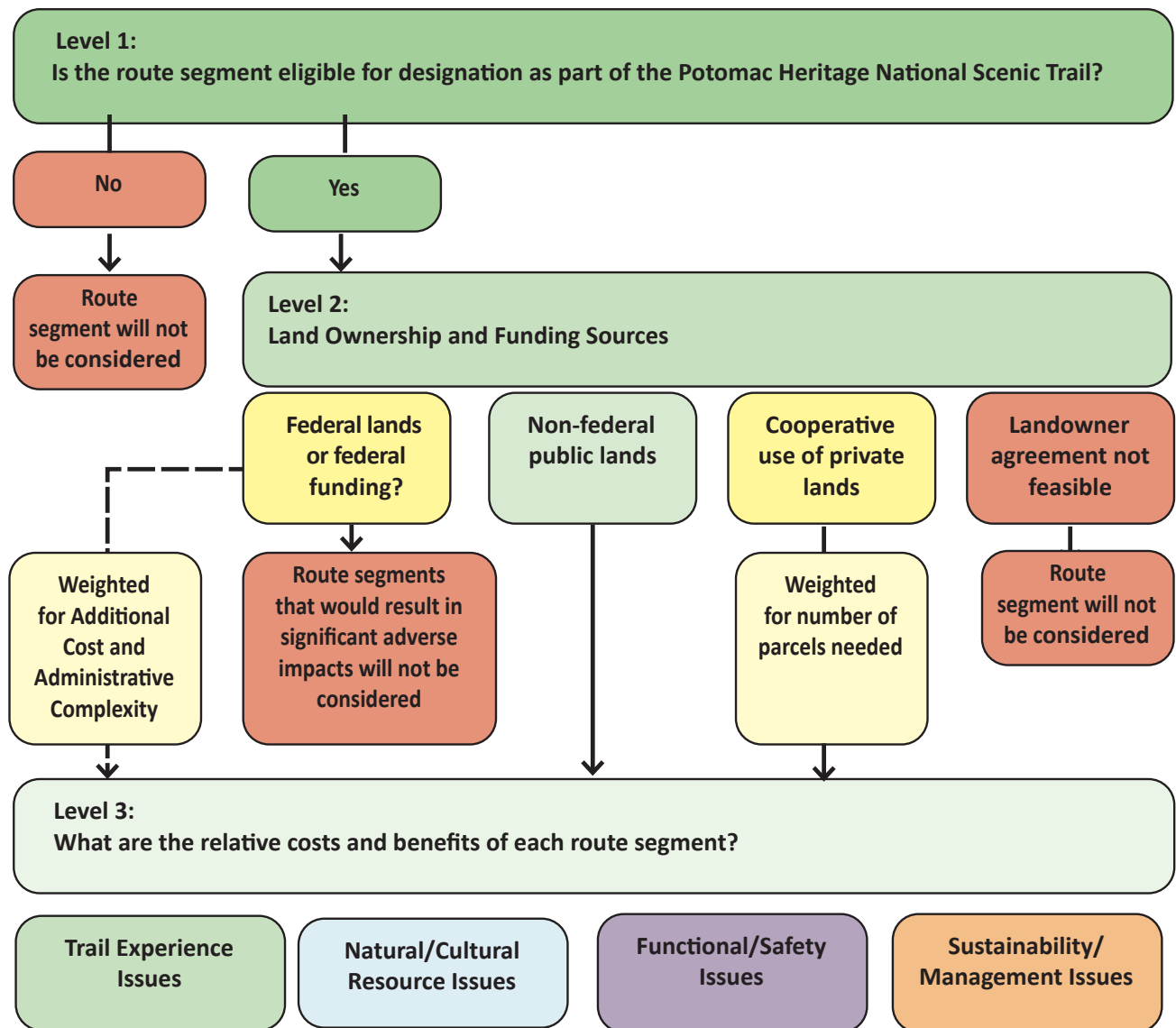


Figure 20 Evaluation criteria flow chart for determining feasibility as described on the following pages.

FEASIBILITY METHODS AND CRITERIA

The methods and evaluation criteria utilized to determine the feasibility of various routes under consideration for designation as part of the Potomac Heritage National Scenic Trail (PHNST) are organized into three levels as shown in Figure 20.

Under Level 1 criteria, any route segment must be eligible for consideration as part of the PHNST. If a route segment does not meet the criteria for designation, it will no longer be considered.

Under Level 2 criteria, land ownership and funding sources are broken out separately for federally owned or funded, non-federal public land, or the cooperative use of private land if needed to complete that route segment. Route segments that cross federal lands, or where federal funding is anticipated, will be weighted to account for the cost implications and administrative complexity of meeting anticipated federal requirements (such as the National

Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), or the Americans with Disabilities Act, ADA). Where cooperative use of private land is anticipated, route segments will be weighted by the number of different owners involved in establishing cooperative relationships for the use of the land. Lands where cooperative arrangements are not anticipated to be feasible will not be further considered for designation as part of the PHNST.

Under Level 3, the feasibility of each route segment will be tabulated by feasibility issue, without further weighting. Route segments will either be able to meet the criteria directly or meet the criteria through mitigation (requiring additional cost and administrative complexity). A route segment that cannot meet the criteria directly or through mitigation, may still be considered but the ramifications of not being able to meet the criteria will need to be factored into the overall feasibility. For example, a route segment that must utilize highly floodprone lands must consider the maintenance and management ramifications.

LINK-NODE SYSTEM OF EVALUATION

Potential routes are delineated using a link to node system where control points (nodes) are established at fixed locations that the overall trail route must pass through (such as an existing bridge, a common intersection, or a desired destination). Route segments are established between the nodes indicating potential options for connecting to the nodes. Each route segment will be evaluated using the criteria discussed on the following pages. The relative feasibility of any route segment will be determined by the number of criteria that are met or mitigated (or not met). A preferred route can then be selected by comparing the total number of feasibility issues that are met for any given combination of segments.

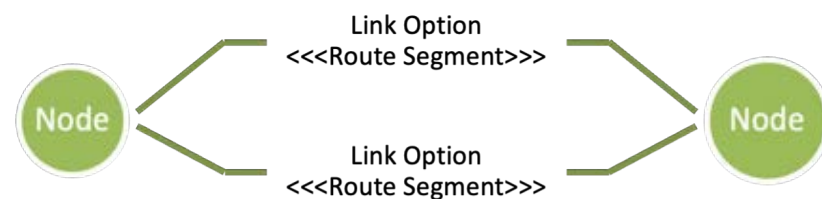


Figure 21 Link node concept for evaluating route segments for feasibility-

WEIGHTING

Specific weighting factors from Level 2 will be applied to Level 3 criteria differently for federal involvement (land or funding), or for private land. For federal involvement, most of the Level 3 criteria that are not met are likely to trigger NEPA requirements. Any action/undertaking on federal land or using federal dollars requires both NEPA and Section 106 of the National Historic Preservation Act (NHPA) - the level of each may vary depending on the action/undertaking for the purposes of the feasibility study, a weighting factor of two (2) will be applied to each issue identified that utilized federal land or funding.

If on private lands, then the issue would likely still need to be addressed but would not require as extensive an evaluation.

For cooperative use of private lands, each parcel would require a separate negotiation. In this case, each private parcel would be added to the total number of issues (e.g., a segment crossing five parcels would include five separate issues, one for each ownership).

MITIGATION AND PREMIUM COSTS

If the feasibility issue can be mitigated using engineered trail design or structures, then premium costs would be assigned to the route segment. Premium costs may be assigned as a multiplying factor against standard trail construction cost (such as for a trail requiring a boardwalk or retainage). Premium costs will be factored into high and low categories, depending upon the type of mitigation required.

Off-road trail related premium costs would include addressing issues such as trail construction on steep slopes, rocky terrain, or watercourse/wetland crossing. Route segments that are within a public road right-of-way would incur premium costs if roadway related utilities, drainage facilities, or widening are needed to accommodate the trail.



Figure 22 Constructing a trail along the edge of the overhead electric transmission line corridor would include premium costs for steep slopes and the watercourse crossing.



Figure 23 Widening the existing asphalt path along Balls Bluff Road may incur premium costs if the curb and gutter system need to be modified.

METHODS AND EVALUATION CRITERIA - DETAILS

The following documents how each criterion would be applied in the feasibility evaluation for the PHNST.

LEVEL 1: **ELIGIBILITY FOR DESIGNATION AS PART OF THE POTOMAC HERITAGE NATIONAL SCENIC TRAIL**

Is the trail segment eligible for designation as a National Scenic Trail and will NPS accept the route segment into the PHNST system? If yes, then continue to level 2. If no, then the route segment will not be considered.



1.1 Criteria for Designation as Part of the Potomac Heritage National Scenic Trail system

Excerpt from NTS Act¹

- (2) National scenic trails, established as provided in section 5 of this Act, which will be extended trails so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass. National scenic trails may be located so as to represent desert, marsh, grassland, mountain, canyon, river, forest, and other areas, as well as landforms which exhibit significant characteristics of the physiographic regions of the Nation.
- (4) Connecting or side trails, established as provided in section 6 of this Act, which will provide additional points of public access to national recreation, national scenic or national historic trails or which will provide connections between such trails.

1.2 Trail segment Supports the Purpose and Significance Statement for the Potomac Heritage National Scenic Trail

Excerpt from PHNST Foundation Document²

- Trail Purpose
The Potomac Heritage National Scenic Trail designation provides a means to establish an inter-connected trail network between the mouth of the Potomac River and the Allegheny Highlands and offers—through partnerships with and among agencies and citizen groups—exceptional hiking and other non-motorized recreational and educational experiences rich with geographic, ecological, historical, and social diversity.
- Trail Significance
Significance statements express why resources and values are important enough to merit designation as a component of the national trails system and/or a unit of the national park system. These statements are linked to the purpose of the trail or unit and are supported by data, research, and consensus. Statements of significance describe the distinctive nature of the trail or unit and why the area is important within a global, national, regional, and systemwide context. They focus on the most important resources and values that will assist in park planning and management. The following statements have been developed to describe the significance of the

¹ THE NATIONAL TRAILS SYSTEM ACT (P.L. 90-543, as amended through P.L. 116-9, March 12, 2019) (as found in United States Code, Vol. 16, Sections 1241-1251)

² National Park Service, US Department of Interior, Foundation Document Potomac Heritage National Scenic Trail, District of Columbia, Maryland, Pennsylvania, and Virginia, October 2014

Potomac Heritage National Scenic Trail. With the Potomac River as the namesake and a primary resource, the Trail corridor and evolving network are significant in a national context. (Please note that the sequence of the statements does not reflect the level of significance):

1. The corridor designated for the Potomac Heritage National Scenic Trail expresses George Washington's vision of a "great avenue into the Western Country." The first president's association with the Potomac River strengthened his life-long goal of "the practicability of an easy and short communication between the Waters of the Ohio and Potomac."
2. Increased environmental awareness in the second half of the 20th century has led to cleaner rivers and streams in the Trail corridor, with the Potomac River recognized nationally as a model of successful restoration and an ongoing challenge for sustained ecological health.
3. The great national conflict of the Civil War is reflected in microcosm within the Trail corridor, with the Potomac River often acting as a boundary between North and South.
4. The Trail provides outstanding opportunities for people to explore the connections and contrasts between and among diverse landscapes and the history and communities in five physiographic provinces.

1.3 Trail Segment Meets the Administrative Criteria for Acceptance into the Potomac Heritage National Scenic Trail System.

- Available for public access for a minimum of 10-20 years
- Safe for public use
- Route itself provides access to destinations for exceptional hiking and other non-motorized recreational and educational experiences rich with geographic, ecological, historical, and social diversity as outlined in the PHNST Foundation Document³

Examples of Criteria Application

A route segment that provides access to a destination that contributes to the users understanding of the significance of the PHNST corridor would be eligible for consideration (e.g. connecting to an historic site explaining how the Potomac River acted as a boundary between the North and South). However, a route segment that provides access to an historic site unrelated to the four significance statements found in the Foundation document would not be eligible.

Only those route segments meeting the eligibility criteria have been moved up to Level 2.

LEVEL 2: LAND OWNERSHIP AND FUNDING SOURCES:

Will the route segment require the use of federal lands or federal funds? If yes, then additional administrative complexity and premium costs apply over and above segments that do not use federal lands or federal funds. Examples include the costs and oversight associated with NEPA, NHPA, and/or ADA compliance.



³ National Park Service, US Department of Interior, Foundation Document Potomac Heritage National Scenic Trail, District of Columbia, Maryland, Pennsylvania, and Virginia, October 2014

Will the route utilize lands that are within areas designated through local or state programs that may trigger additional studies or mitigation requirements? Examples include local zoning overlay districts, state designated areas of natural or cultural resource interest, among others.

Will the route segment involve the cooperative use of private lands?

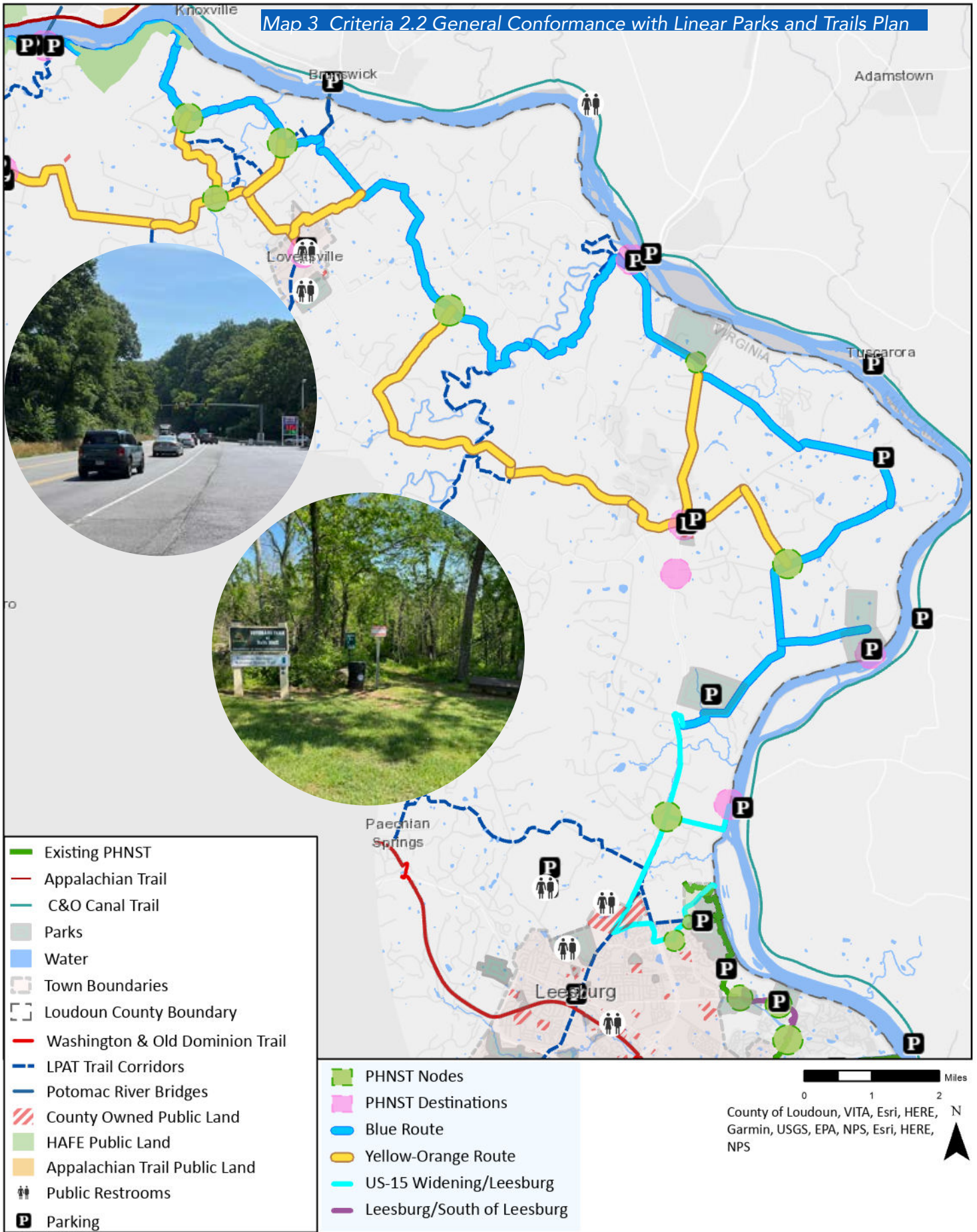
2.1 Segments Involving Federal Lands and Funding

- Segments involving federal lands and funding are subject to increasing administrative complexity and related financial impacts. Planning and operating national trails as Federal actions are subject to a large body of law and regulation. Extending the existing trail across federal lands or with federal funding will likely require compliance with those laws and regulations as spelled out in [Reference Manual 45, National Trails System](#). The National Environmental Policy Act (NEPA) requires that prior to undertaking a Federal action, Federal agencies must take into account impacts on the environment and try to minimize such impacts.
- Route segments that avoid impacts subject to NEPA (meeting the requirements for a categorical exclusion under NEPA) will likely require less administrative and financial complexities. For description of actions that require and do not require a categorical exclusion see [National Park Service NEPA Handbook](#) (2015). In summary, to avoid a categorical exclusion or further NEPA requirements, the action will not:
 - Increase public use to the extent of compromising the nature and character of the area or causing physical damage to it
 - Introduce non-compatible uses which might compromise the nature and characteristics of the area, or cause physical damage to it
 - Conflict with adjacent ownerships or land uses
 - Cause a nuisance to adjacent owners or occupants (a typical nuisance ordinance defines nuisances as conditions that could damage, inconvenience, or annoy the owner's neighbors)
- Trails that access federal lands or funds may be required to meet the Architectural Barriers Act (ABA) Accessibility Standards for newly constructed or altered pedestrian trails on federal sites which may have implications for trail cost and alignment.

2.2 Segments are in General Conformance with the Loudoun Linear Parks and Trails Plan (LPAT)

- Trail route segments will be in general conformance with statewide and local comprehensive plans.
 - Trail development is an acceptable use in accordance with statewide or Loudoun County land use plans, policy documents, and zoning ordinances
 - General conformance with Linear Park and Trails Plan (See LPAT Figure 10 on page 4)
 - √ Identified as an LPAT Corridor
 - √ Connecting link to or from an LPAT corridor
 - √ Consideration of alternate route alignment parallel to or in lieu of identified LPAT corridor

Map 3 Criteria 2.2 General Conformance with Linear Parks and Trails Plan



2.3 Segments Involving Private Land Through Cooperative Partnership

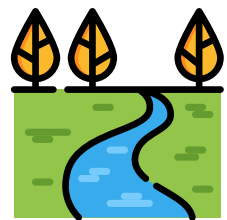
- Trail route segments are supported by individual land owner(s) for the potential use of land for public trail purposes
 - Segments requiring use of private lands ranked according to the number of privately owned parcels (fewer number of owners per segment indicate greater feasibility)
 - If cooperative use of private land is not anticipated to result in a feasible outcome, then that route segment will no longer be considered

LEVEL 3: TRAIL SPECIFIC CRITERIA

Criteria are utilized to compare the costs and benefits of trail segments among each other. A route segment that avoids areas with certain environmental or cultural resource constraints and functional/safety issues are relatively more feasible than those that do not. Route segments that have a high quality trail experience, are sustainable, and more readily managed will rank higher than those that do not. For example, a route segment that crosses wetland and streams at their narrowest point will rank higher than those that cross at wider points or at a shallow angle. On the benefit side, a route segment that increases connectivity to or between desired destinations will rank higher than those that do not.

Trail Experience Issues

Trail segments will either contribute positively to the desired trail experience or not. Criteria 3.5 recognizes that not all trail segments will be desirable for every user type, but that trail experience could be provided as part of a braided network of trails serving the same desired destinations.



3.1 Physical or Visual Access to the Potomac River

- Shoreline is visible, or within the visual corridor of the Potomac River (view of the river during at least part of the year)
- Provides a direct connecting route to Potomac River public access (one or two turns)

3.2 Provides Direct Connection Between PHNST Destinations

- Access to destinations as identified in the NVRC Corridor Analysis
- Water trail access and public landings
- Scenic views
- Nearby parks, historical sites, visitor attractions/destinations
- Access to destinations associated with the Potomac River as identified in LPAT or other Loudoun County planning documents and policies (e. g. local tourism entities)

3.3 Enhances Outdoor Recreation Potential

- Provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass
- Serves multiple user types
- Serves single use type with alternate braided trail experience (3.5 below)

3.4 Engages Diverse Users

- Enhances relevance, access, and participation on national trails for traditionally underrepresented and underserved communities (as prioritized in LPAT, page 149)

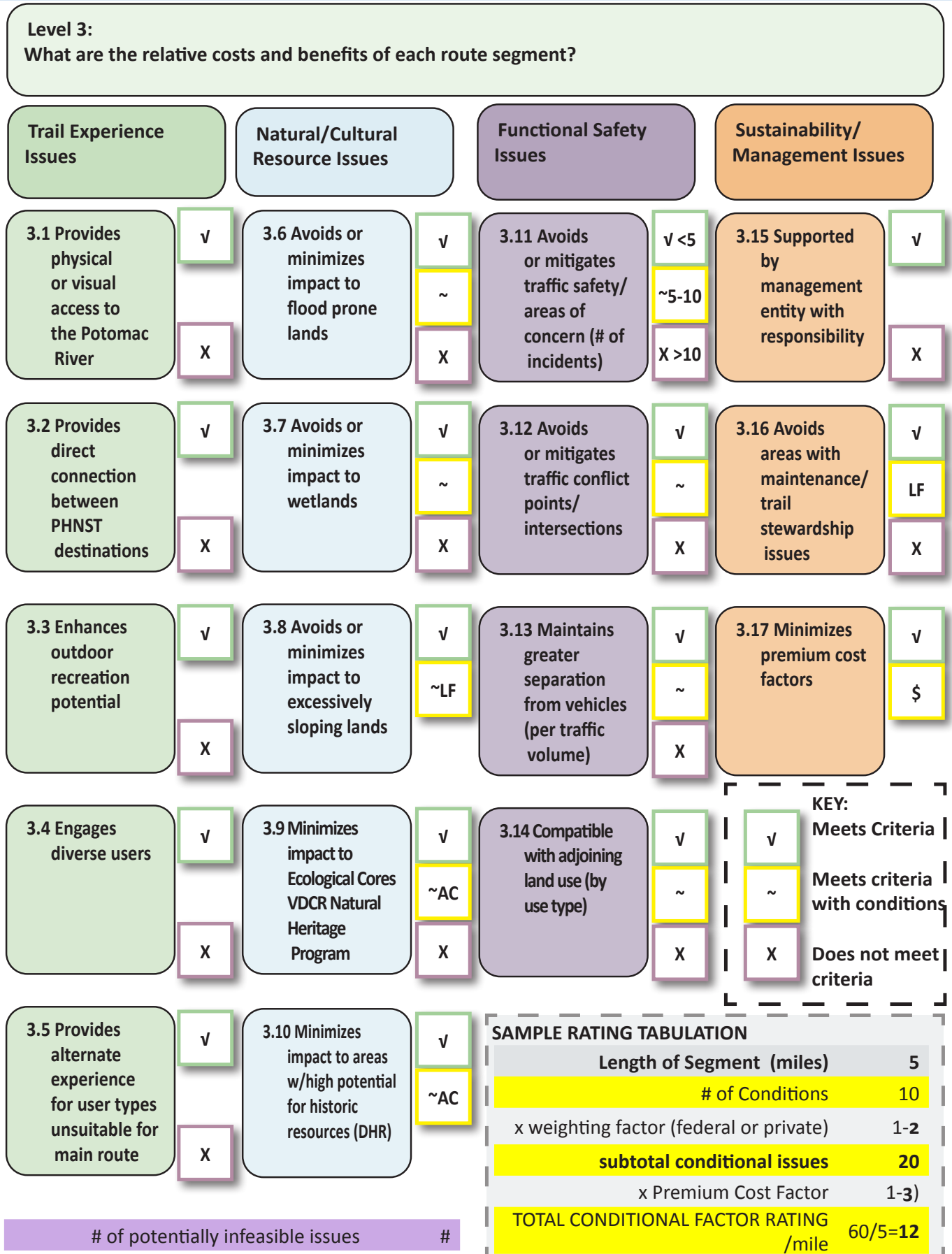


Figure 24 Level 3 criteria for evaluating the feasibility of PHNST route segments

- Improves trail access in and/or to High Priority Community (from LPAT)
 - √ New connections to or within census tracts identified as high-priority from an equitable trail planning standpoint
 - √ High-priority Census tracts were identified through a weighted mapping methodology with stakeholder input
- Improves Level of Service in Underserved Community
 - √ New trail with a Census tract that currently has zero trails

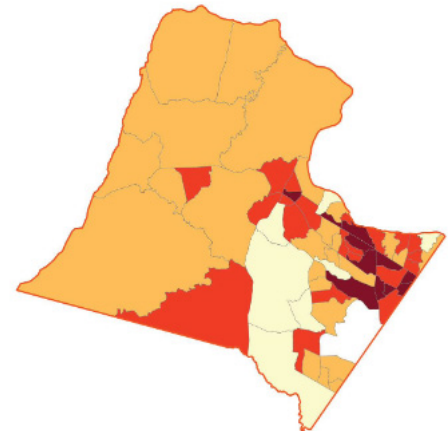


Figure 25 High-priority traditionally underrepresented and underserved Loudoun Census tracts as identified in LPAT planning process (red and dark reds)

3.5 Provides Alternate or Braided Trail Experience for User Types that May Not Be Suitable for Use on the Designated Route

- Natural surface trail on existing public right-of-way
- On road bicycle route (bike lane, shared lane, bikeable shoulder, low volume < 400 ADT)
- Equestrian (bypass route more suitable for equine use)
- Water trail segment with public hand-carry boat access

Natural Cultural Resources

Issues that can be avoided will be ranked higher (more feasible) than those that cannot be minimized or avoided. Minimizing impacts through mitigation will likely include premium costs (such as the construction of a boardwalk over wetlands). A trail route segment can partially avoid impacts by skirting the edge of the area (depending upon the type of value), versus cutting right through the middle. Similarly, a trail route segment can partially avoid impacts to an area with a high likelihood of containing historic resources listed on the National Register by changing or adjusting the trail design in a manner that is consistent with The Secretary of the Interior’s Standards for the Treatment of Historic Properties.

For each of the criteria listed below the following criteria will apply:

- √ = meets criteria
- ~ = minimizes by meeting criteria with conditions
- X = does not meet criteria



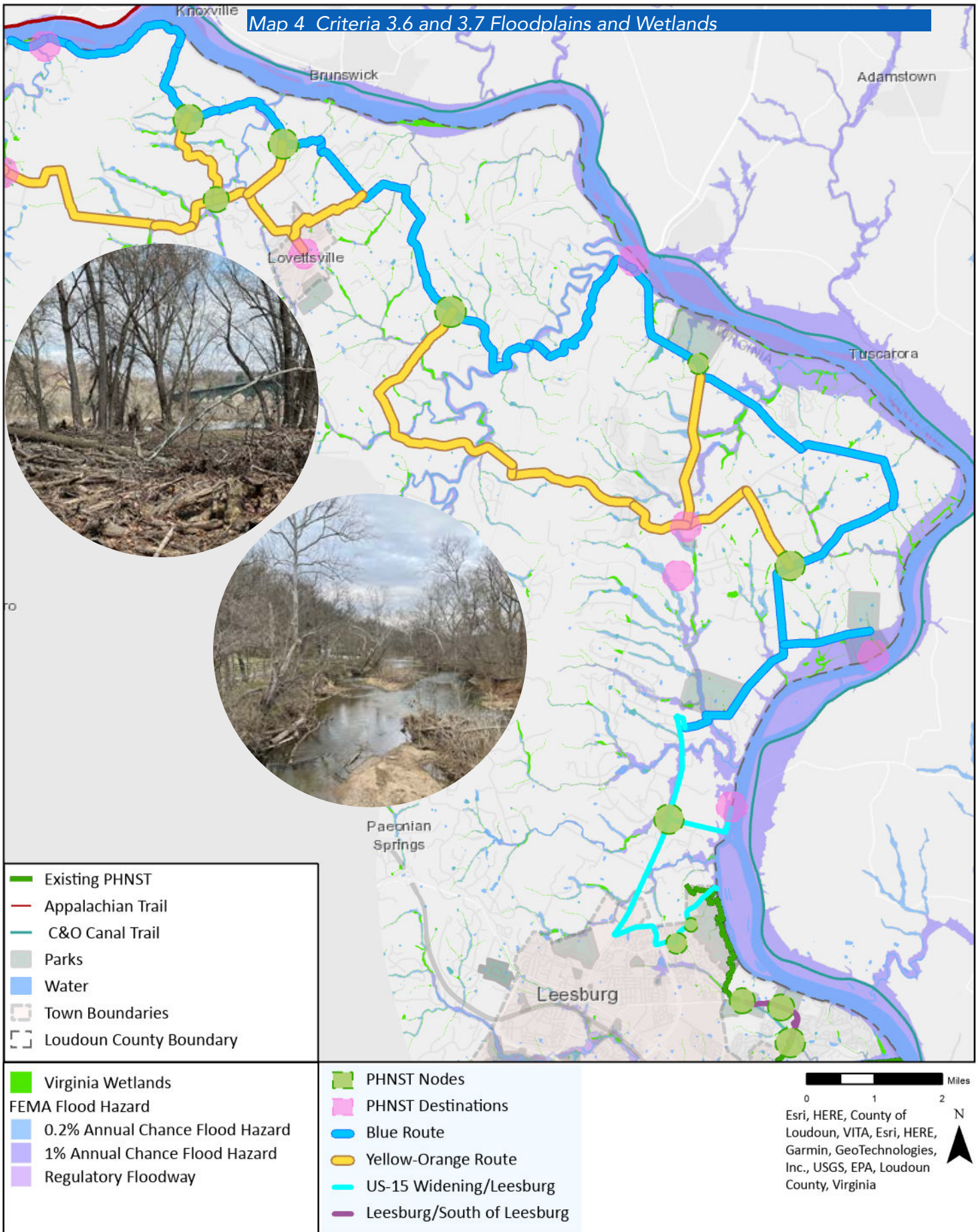
3.6 Avoids or Minimizes Impacts to Floodprone Lands

- (√) Crossing of flood prone lands does not impact up or downstream flooding potential
- (~) Crossing of flood prone lands is at narrowest segment possible
- (X) Located within 1 in 500-year floodplain (reflects future rises in flood elevations) or more frequent (does not meet criteria)

3.7 Avoids or Minimizes Impacts to Wetlands

- (√) Upland
- (~) Crossing of wetland areas at narrowest segment possible
- (X) Located within areas identified on the National Wetland Inventory maps or by Loudoun County data wetland potential (does not meet criteria)

Map 4 Criteria 3.6 and 3.7 Floodplains and Wetlands



3.8 Avoids or Minimizes Impacts to Excessively Sloping Lands

- (✓) Avoids steeply sloping lands (<25%)
- (~) Natural surface trail construction requires bench cuts greater than 4' in height with maximum 1:1 cut slope (e.g., one foot of rise for every one foot of run) and/or requires retainage to maintain a level trail surface (geotechnical engineering / mitigation required for cut bank)

3.9 Avoids or Minimizes Impact to Areas Identified by VDCR as Ecological Cores⁴

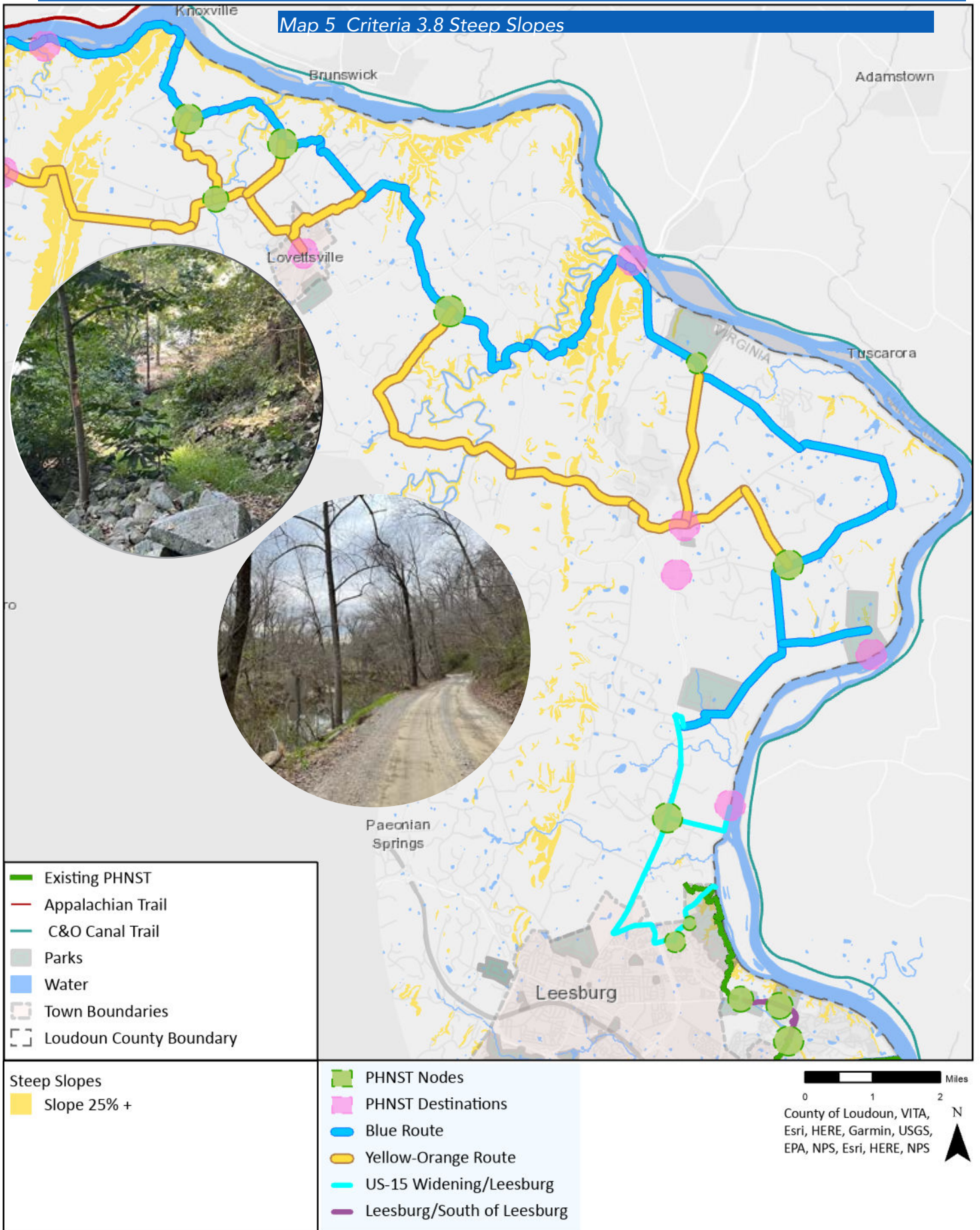
- (✓) Avoids DCR Natural Heritage Ecological Cores C1, C2 or C3
- (~) Limited use and/or mitigated use of Ecological Cores C1, C2 or C3 (require invasive species management plan and maintenance commitment) and the following by area
 - Mitigation for C1 Outstanding – locate trail in previously disturbed areas such as former road traces
 - Mitigation for C2 Very High or C3 High – locate trails along previously disturbed or along fringe locations and use sustainable trail design to minimize land disturbance, runoff
- (X) Crosses/splits Ecological Cores C1, C2 or C3

3.10 Avoids or Minimizes Impact to Areas with High Potential for Historic Resources

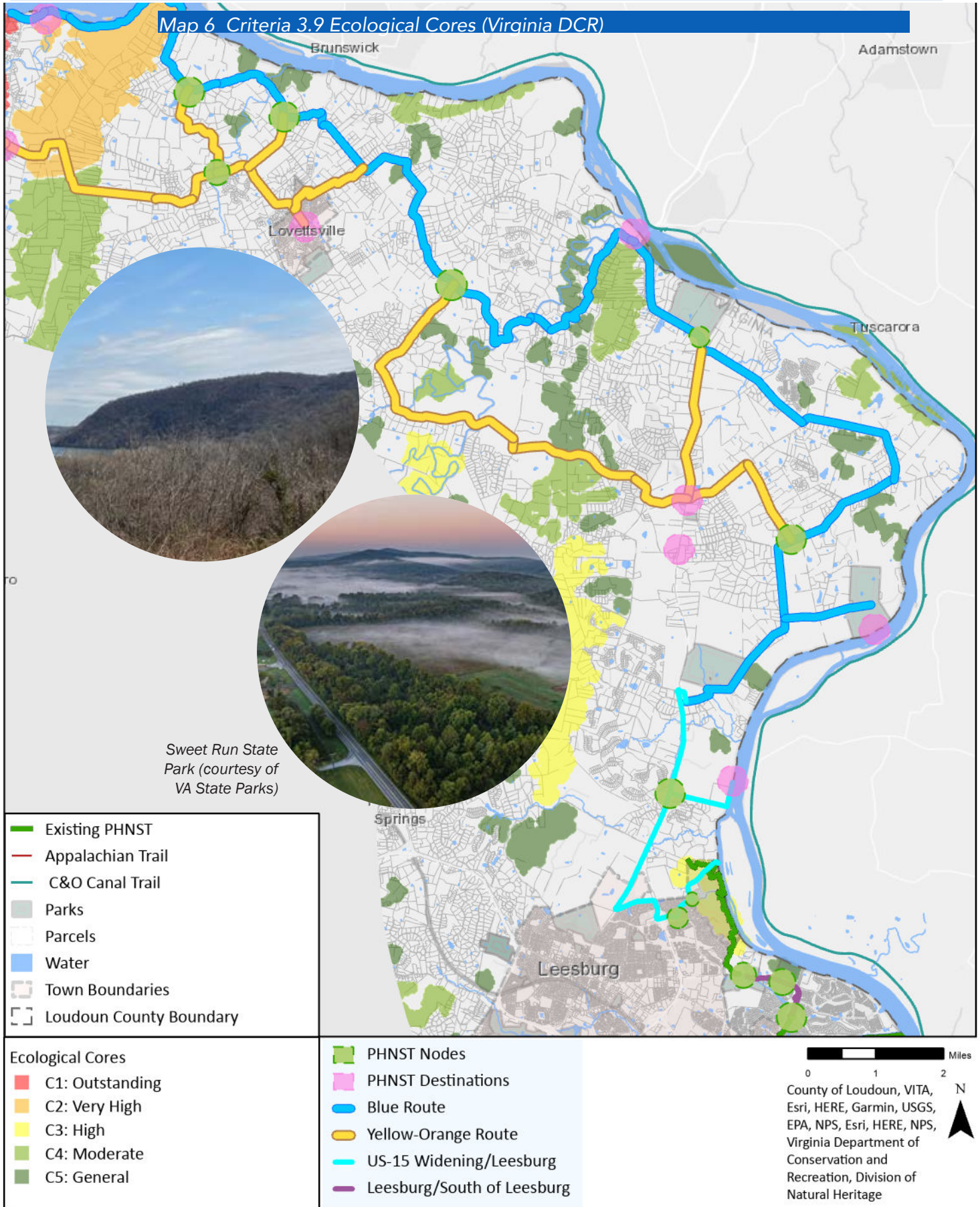
- Use VDCR Cultural Resource Preservation Index to measure potential impacts⁵ and if found evaluate potential impacts using site specific information:
 - (✓) Avoids Level 3 – contains resources listed as National Landmarks (avoid direct impacts)
 - (~) Avoids Level 2 – contains resources listed or eligible for National Register of Historic Places/Virginia Landmarks Registry

4 The Virginia Natural Landscape Assessment (VaNLA), a component of the Virginia Conservation Vision, is a landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia. Using land cover data derived from satellite imagery, the VaNLA identifies unfragmented natural habitats called Ecological Cores, as large patches of natural land cover (mainly upland forests and forested wetlands statewide, but also marshes, beaches, and dunes in the coastal plain) with at least 100 acres of interior conditions. Large, medium, and small Ecological Cores have been identified, along with a smaller feature type called Habitat Fragments that may be important in more urban localities. Ecological Cores provide habitat for a wide range of species, from those dependent upon interior forests to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Ecological Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection), and carbon sequestration, along with the associated economic benefits of these ecosystem services. Ecological Cores are connected by Landscape Corridors and aggregated with contiguous natural cover into larger planning units called Natural Landscape Blocks.

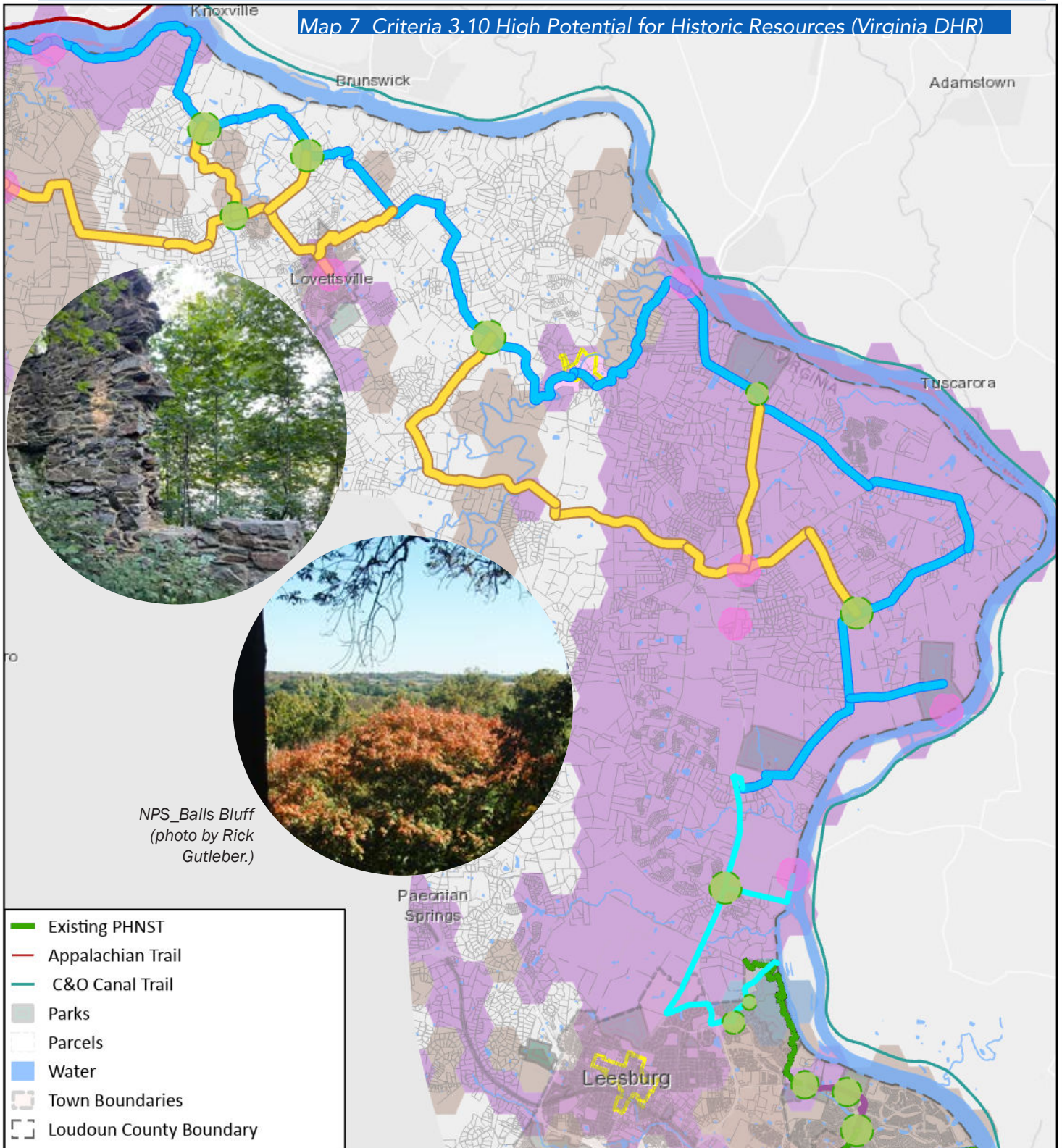
5 The Cultural Resource Preservation Index displays likelihood of a given location to have conservation value when considering known and evaluated cultural heritage resources. For the purposes of obscuring sensitive boundaries, the Commonwealth of Virginia was divided into a hexagon grid (individual hexagons are ~250 acres in size). Resources that have been surveyed in the inventory of the Department of Historic Resources (DHR) were ranked by levels of cultural interest, defined in the attribute field MAX_Preservation_Index as: 3 = Listed as National Historic Landmarks (Highest) 2 = Listed on, contributing to, or eligible for listing on the National Register of Historic Places/Virginia Landmarks Register 1 = Sites/properties without formal evaluations of eligibility that are recommended to have potential for eligibility Resources with rankings attached were joined to the hexagons and all attribute data was stripped away. The index value for each hex is equal to the highest value of cultural significance contain within it. For example, if three resources overlap within a hexagon with values of 2, 1, and 3 the value of the hexagon will be 3. The index value is not cumulative. This dataset does not include sites or properties that remain unevaluated, nor does it include areas of the commonwealth that have not been surveyed for cultural resources. For more information, go to: <http://www.dcr.virginia.gov/natural-heritage/vaconviscultural>



Map 6 Criteria 3.9 Ecological Cores (Virginia DCR)



Map 7 Criteria 3.10 High Potential for Historic Resources (Virginia DHR)



NPS_Balls Bluff
(photo by Rick Gutleber.)

- Existing PHNST
- Appalachian Trail
- C&O Canal Trail
- Parks
- Parcels
- Water
- Town Boundaries
- Loudoun County Boundary

- Loudoun Historic Districts
 - National Register Historic Districts
- Cultural Resource Preservation Index
- 3
 - 2
 - 1

- PHNST Nodes
- PHNST Destinations
- Blue Route
- Yellow-Orange Route
- US-15 Widening/Leesburg
- Leesburg/South of Leesburg

0 1 2 Miles

Esri, HERE, County of Loudoun, VITA, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, Virginia Department of Historic Resources - March 15, 2018, Loudoun County, Virginia

N

- (~) Mitigation would include more detailed study for Level 1 designation (sites or areas recommended for potential to be evaluated) and for areas where resources are found, to conduct more detailed study (minimum of Phase 1) to determine potential impacts and recommended mitigation

Functional/Safety Issues

Areas with either functional or safety issues that can be avoided will rank higher for feasibility than those that cannot. For traffic/safety, segments where the area of concern can be mitigated (such as through incorporating proven safety counter measures) will generally be assigned premium costs associated with those countermeasures for that particular route segment. Areas with compatible land use will rank higher than those that are not compatible. For example, a trail that connects or is associated with a compatible business or serves to connect a nearby neighborhood will rank higher than a route segment that runs immediately parallel to a residential neighborhood. Premium costs may be assigned where land use encroachment can be mitigated, such as through a suitable buffer or fencing.



3.11 Avoids or Mitigates Traffic Safety Areas of Concern

- Avoids areas of traffic/safety concerns based upon (volume/crash history)
 - (✓) Safe, fewer than 5 incidents/ crashes
 - (~) Moderate, between 5 and 10 crashes
 - (X) Intense, more than 10 crashes

3.12 Avoids or Mitigates Traffic Conflict Points/Intersections

- (✓) Free pedestrian access, primarily all safe crossings
- (~) Moderately free pedestrian flow, some safe crossings and some unsafe crossings that can be mitigated through engineering and design
- (X) Little or no pedestrian access dangerous crossings

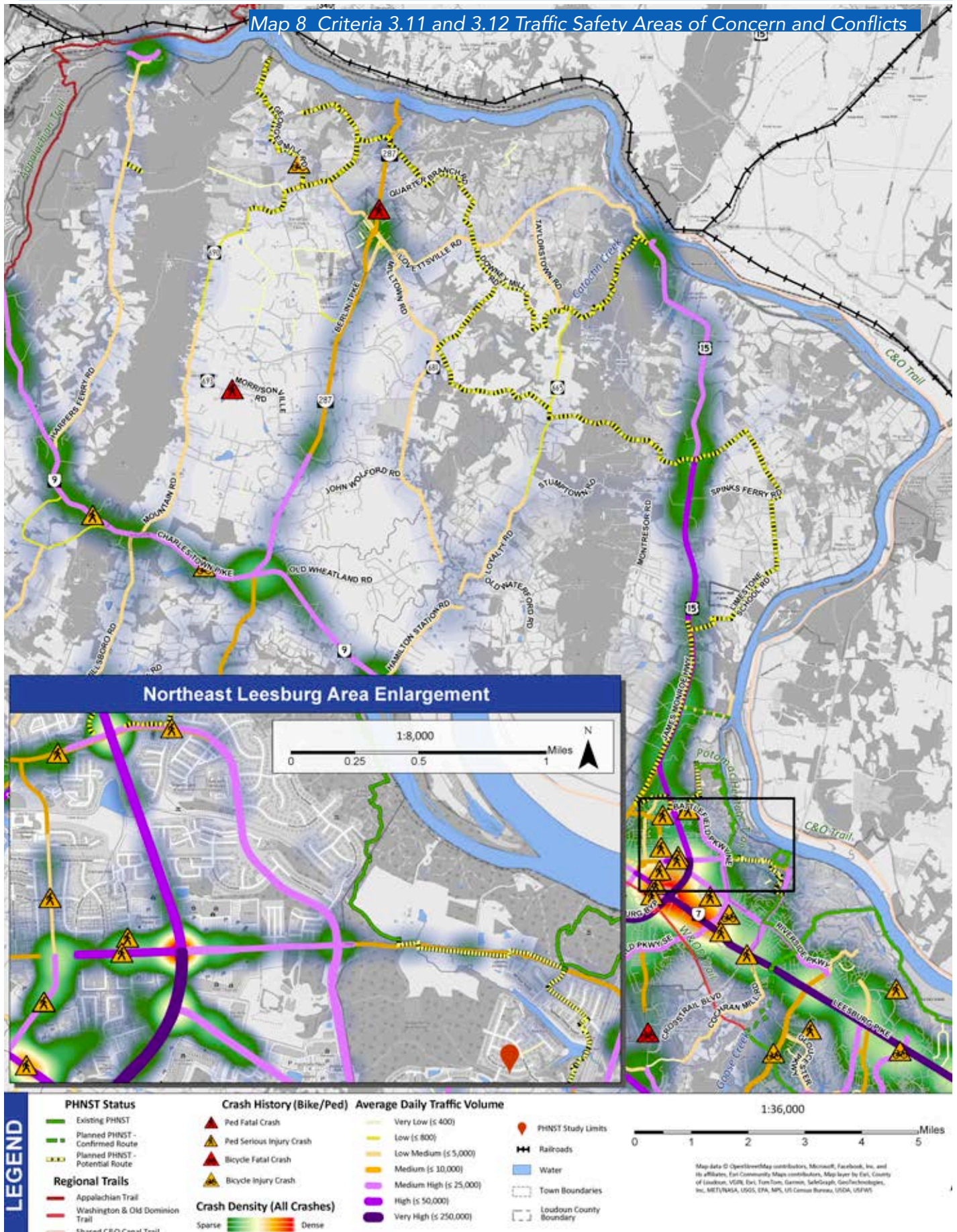
3.13 Provides Greater Separation from Vehicles or Lower Roadway Volume

- (✓) Separated trail on sustainable multi-use surface or route located on very low volume road having less than 400 ADT
- (~) Road shoulder required or on-road required (moderate volume (>400 ADT and <5000 ADT) where mitigation can enhance comfort level for users
- (X) High volume road with no available shoulder

3.14 Compatible with Adjoining Land Use

- (✓) Compatible adjacent uses would include supportive business that would benefit from increased access (such as craft breweries and wineries, lodging, restaurants or businesses with employees benefiting from nearby trail access). Existing conservation lands protected by conservation easement would also be considered compatible as that land use is not likely to change to residential.
- (~) Encroachment would include areas with adjoining incompatible land uses without sufficient buffer (e.g. residential areas or industry with safety or privacy concerns). Encroachment can be mitigated with appropriate buffer, fencing or other trail design measures.

Map 8 Criteria 3.11 and 3.12 Traffic Safety Areas of Concern and Conflicts



Traffic Safety

As part of the examination of existing traffic safety issues in the study corridor, daily traffic volumes (2020 - 2022) and crash history (2019 - 2023), were compiled, examined and mapped to show safer areas suitable for consideration in addressing the gaps and future linkages for the PHNST system. Field and desktop reviews were also conducted to identify problematic

Year	Total Crashes	Fatal Pedestrian Crashes	Fatal Bicycle Crashes	Pedestrian Crashes - Serious Injury	Bicycle Crashes - Serious Injury
2019	4,958	2	1	17	2
2020	3,426	1	0	12	7
2021	4,049	0	0	6	3
2022	4,606	1	1	13	3
2023	4,772	3	0	18	5

Table 1 Western Loudoun Crash History



Figure 26 US 340 bridge approach at Potoma Wayside

transportation linkages and crossings that are existing, will become difficult unsafe crossings, or require extensive mitigation and improvement costs. Map 8 on page 31 depicts the recent crash history within the study corridor. Some of these existing transportation elements may be improved as part of the County’s transportation improvement programs. High traffic volumes and crash densities are exhibited primarily along US 15

and US 9. Applying links of the PHNST along these routes would require creative and expensive designs, with wider separation from the main roadway and particular design effort paid to crossings, in order to provide a safe and scenic trail.

Additional crash hotspots are found near the US 15 and US 340 river crossings, locations that are both characterized by heavier traffic, sharp curves, and a lack of pedestrian accommodations. One crash hotspot, including a fatal pedestrian crash, that is *not* accompanied by high traffic volumes is found in the downtown area of Lovettsville, indicating that there may be issues of sight distance, safe crossings, or other hazards. If the inland route that runs through that area is advanced, particular design attention will have to be paid to the potential causes of accidents and mitigation measures.

Bridge Connections

Bridge crossings over the Potomac River can offer some of the best Potomac Valley views and provide important connections as part of a comprehensive trail network. Today, there are several roadway bridges but there are no dedicated bridges with ADA or AASHTO compliant separated pathways for pedestrians and bicyclists to cross over the Potomac River. Creating safe and convenient pathways for people on foot or bike could be an important connection between the Potomac Heritage National Scenic Trail in Loudoun County, Virginia to destinations in Maryland, such as the Chesapeake & Ohio (C&O) Canal Trail aligned along the Maryland shore of the Potomac River. Today, trail users would have to share a lane on arterial roadways with no shoulder or dedicated sidewalk (with sufficient width) or bike lanes, which is not attractive to casual trail users and a major safety concern. Creating new dedicated and separated trail connections will require significant investment in new bridge structures or modification of existing roadway bridges.

Existing Crossings

Option 1: Route 287 Bridge to Brunswick

The Berlin Turnpike (Virginia Route 287) Bridge connects from rural areas of northern Loudoun County to the historic downtown of Brunswick, Maryland as well as the C&O Canal Trail and Brunswick MARC Train Station. There is strong interest from the Town of Lovettsville to develop a multi-use trail that links to the C&O Canal in Brunswick. Loudoun County's General Plan supports development of this link. Today, this bridge has a three-to-four-foot sidewalk providing pedestrian access and approximately two-foot shoulder. The sidewalk is too narrow to meet ADA-standards, and the railing is too low to meet AASHTO criteria for pedestrian and bikeways. Cyclists may share the lane with vehicular traffic. The bridge is owned and maintained by the Maryland State Highway Administration (SHA) and posted speeds are 30 mph. While not ideal, this bridge currently offers the best trail connection between the PHNST and points across the Potomac River. Bridge modifications with a new cantilever structure could provide a pedestrian path meeting AASHTO and ADA-standards and increase trail user safety and comfort (see page 61).



Figure 27 VA-287 Bridge to Brunswick, MD (Source: Google Street View)

Option 2: Point of Rocks Bridge

The Point of Rocks Bridge is along US 15 crossing the Potomac River between northeastern rural Loudoun County to Point of Rocks, Maryland where it offers close proximity to the C&O Canal Trail, parklands, boat launch, and the Point of Rocks MARC Train Station. This is a historic truss bridge along the Journey Through Journey Through Hallowed Ground National Scenic Byway. This bridge is two through lanes and no sidewalk or dedicated bicycle path. The bridge is owned and maintained by the Maryland State Highway Administration (SHA) and posted speeds are 45 mph. Bridge modifications with a new cantilever structure could provide a pedestrian path meeting AASHTO and ADA-standards and increase trail user safety and comfort.



Figure 28 Point of Rocks Bridge (Source: Google Street View)

Option 3: US 340 Bridge over the Potomac River

US 340 crosses the Potomac River between Loudoun Heights, VA and Knoxville MD, in the upper northwest portion of Loudoun County near Harpers Ferry, WV. The bridge is owned and maintained by the Maryland State Highway Administration (SHA). The existing travel-way includes two through lanes with no shoulders. Concrete jersey barriers have been added to the structure to protect the historic railing from potential crash damage. There is no dedicated space for pedestrian and cyclists, and speed limits are posted at 45 mph. As is, this bridge would not provide a safe or attractive pathway for PHNST users. Bridge modifications with a new cantilever structure could provide a pedestrian path meeting AASHTO and ADA-standards and increase trail user safety and comfort.



Figure 29 US 340 bridge over the Potomac River existing conditions (Source: Google Street View)

Sustainability/Management Issues

The relative feasibility of route segments under consideration will be greater for those where a management entity will take responsibility for the management of the trail and have existing visitor infrastructure already in place. In addition, the relative feasibility of a route segment will be greater if there is enough room to design the trail using sustainable trail design principles and where there are fewer trail specific feasibility issues that require a higher level of engineering to resolve.



3.15 Management Entity and Responsibility

- (✓) Responsibility for maintenance and user oversight is clearly defined (GA)

3.16 Visitor Infrastructure

- (✓) Trail segment is supported by existing parking and restrooms within a ½ day travel experience⁶
- (~) Trail segment not meeting this criterion could be mitigated with additional visitor infrastructure

3.17 Maintenance/Trail Stewardship Factors

- Trail segment can be designed using sustainable trail design principles (e.g. contour alignment, surface runoff managed away from the trail, crossings managed)
- Trail segment lacking an ability to be designed sustainably could be mitigated through trail design such as engineered surfaces, retaining, walls, or structures to achieve sustainable alignment (or modifications to existing surface or alignment)
- Trail segment cannot be designed using sustainable design principles and will require constant maintenance/restoration to trail surface (more frequent than annual are not considered sustainable)

3.18 Premium Cost Factors

- Trail segment avoids or minimizes premium costs (avoids areas requiring additional costs over and above standard costs associated with new structures, retaining walls, and engineered trail surfaces needed to mitigate impacts).

√ - standard trail design, no premium costs

\$ - engineered trail design surfaces, trail drainage, retaining, walls or structures

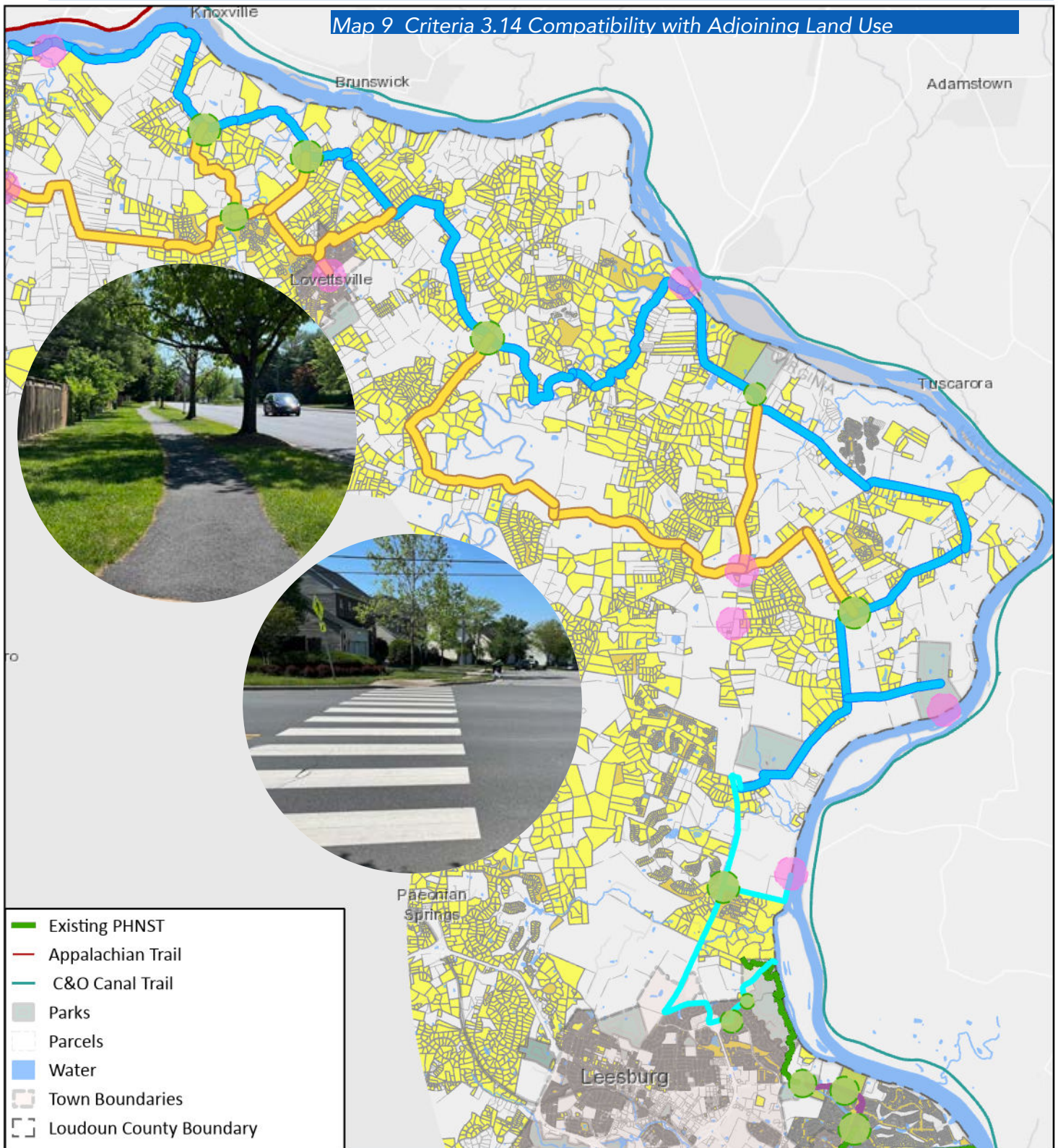
\$\$ - modification of roadway drainage, embankments, utilities

\$\$\$ - modification of full roadway section to provide more separation for users or to reduce conflicts at intersections

This criterion will be evaluated for each segment by adding up the total number of feasibility issues requiring mitigation.

⁶ Placement of trailhead with parking and restrooms varies by context and trail user type. There are no specific guidelines for spacing of trailheads, but their location needs to be coordinated with localities, neighbors, and tailored to the anticipated trail users. The spacing of trailheads and parking with a minimum of ½ day travel increments allows for out and back day trips (e.g. 2-3 net miles per hour for foot trail and 6-8 net miles per hour for bicycling). Trailheads can also be placed to increase connectivity for population centers and in relationship to desired destinations. The criteria reflect the minimum.

Map 9 Criteria 3.14 Compatibility with Adjoining Land Use



- Existing PHNST
- Appalachian Trail
- C&O Canal Trail
- Parks
- Parcels
- Water
- Town Boundaries
- Loudoun County Boundary

- Land Use**
- Residential
 - HOA

- PHNST Nodes
- PHNST Destinations
- Blue Route
- Yellow-Orange Route
- US-15 Widening/Leesburg
- Leesburg/South of Leesburg

0 1 2 Miles

Esri, HERE, County of Loudoun, VITA, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA

N

IDENTIFICATION OF POTENTIAL ROUTE SEGMENTS

As described in the section “Link-Node System of Evaluation” on page 16, potential route segments (links) were identified for further analysis for their potential designation as the Potomac Heritage National Scenic Trail. Potential route segments were first identified through an initial inventory of the following:



Figure 30 Featherbed Lane is an example of a low volume, unpaved road considered for designation

- Existing and planned trails on public land
- Connecting route segments on public low volume/gravel roads
- Trail corridors identified in the approved LPAT plan nearest the Potomac River
- Trail corridors where private owners have agreed, at least in concept, to consider a trail corridor on their land
- Planned trails identified as part of the countywide transportation bicycle and pedestrian plan
- Planned and committed trails incorporated into capital improvement projects for the Town of Leesburg (US 15 Bypass) and Loudoun County (US 15 Widening)

Nodes were then identified at decision points (intersections) where options are needed to address any significant feasibility issue that could heavily constrain a route segment from being used in the near to mid-term. Certain nodes may also be identified as the best location to cross a major highway.



Figure 31 Existing PHNST natural surface trail route in Edwards Landing Park (Town of Leesburg)

ADJUSTMENTS TO PREVIOUSLY CONFIRMED PHNST ROUTES

Several route segments have been revised from previously confirmed routes after discussions with the responsible land management parties. These include two routes that are part of ongoing and high priority capital improvement projects (US 15 Widening Project and Town of Leesburg US 15 Bypass crossing) and routing from Northlake Boulevard to Red Rocks Overlook Park.

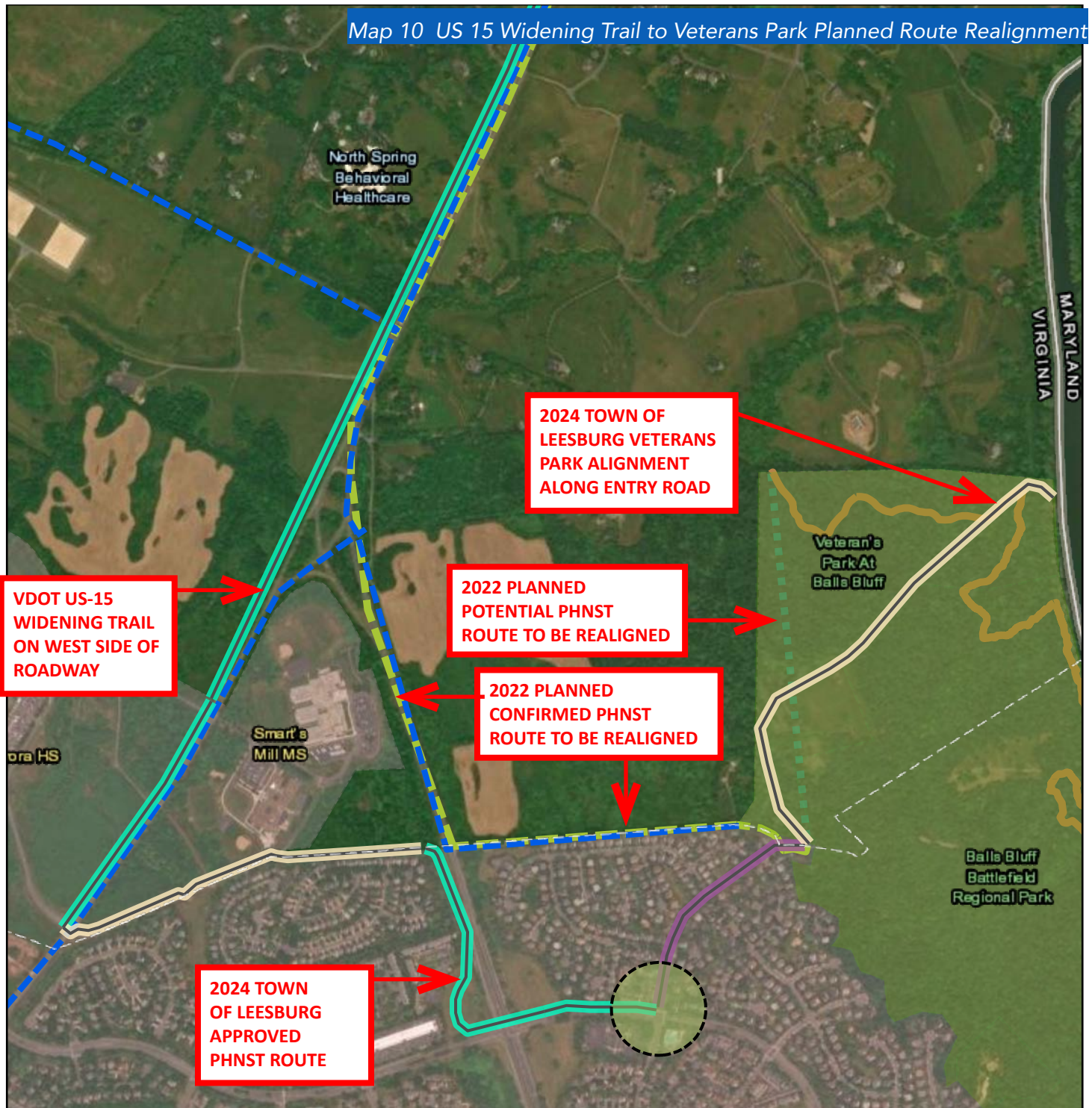
US 15 Widening to Battlefield Parkway Overpass

For the Leesburg Bypass crossing, the Town of Leesburg has adopted a specific location for the PHNST using a planned overpass on Battlefield Parkway, rather than a crossing at Dry Hollow Road (Map 10 on page 37). Therefore the Dry Hollow Road planned and confirmed route between the entrance to Veterans Park to the US 15 Bypass will be replaced with the Town of Leesburg preferred route using the Battlefield Parkway Bypass Crossing connecting up to the westerly portion of Dry Hollow Road and then to Tuscarora High School/US 15 intersection.

Veterans Park Realignment

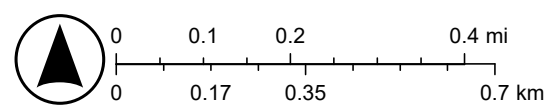
The route connecting to the existing PHNST trail at the Balls Bluff Battlefield Park through the Town of Leesburg’s Veterans Park will be realigned along the main entrance road as part of the Park Development project to be constructed in 2025.

Map 10 US 15 Widening Trail to Veterans Park Planned Route Realignment

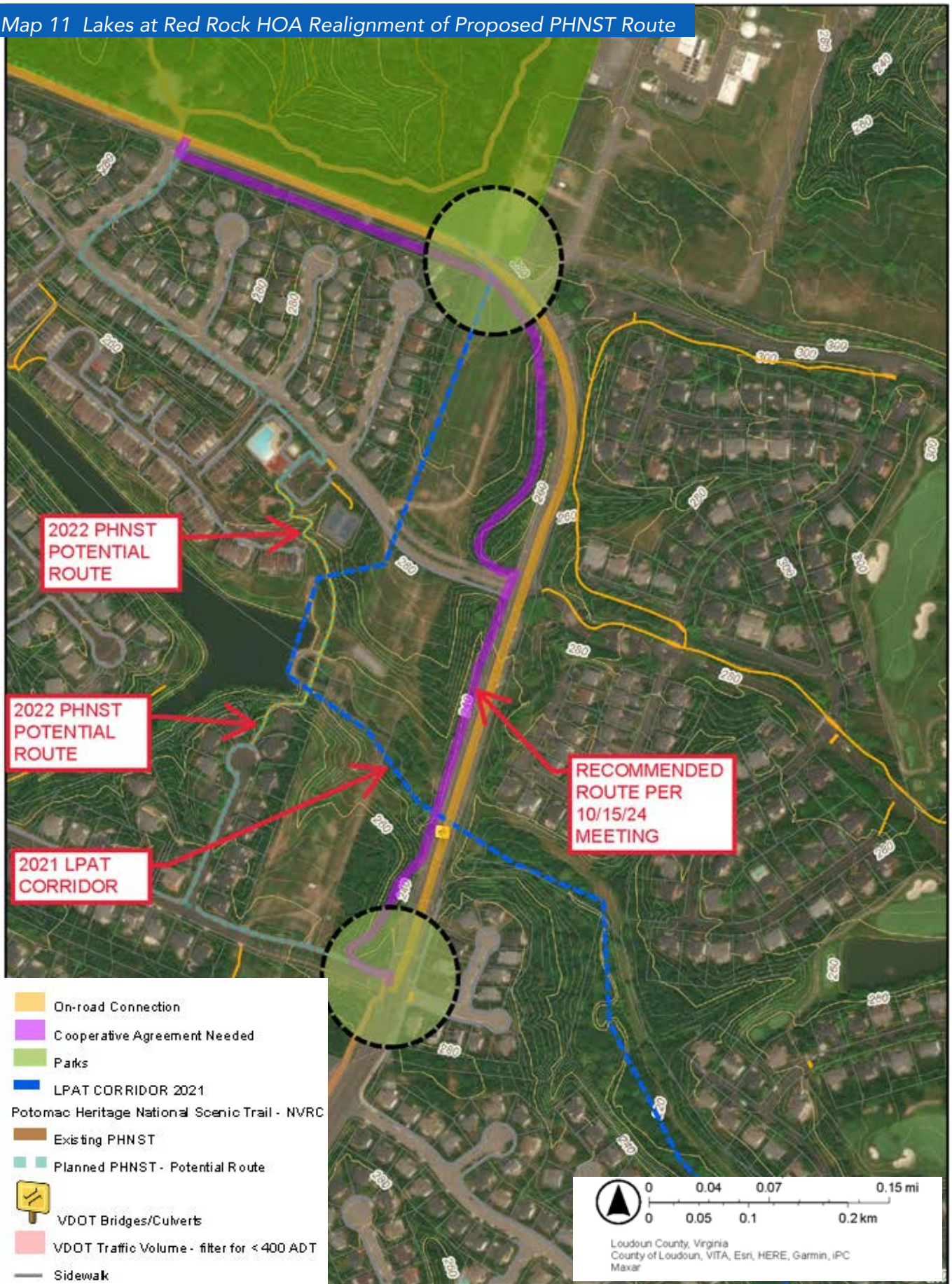


- Limited Feasibility
- US-15 Widening Project
- US 15 Bypass Project
- Leesburg Feasible
- Parks
- LPAT Corridors

- Planned PHNST - Potential Route
- Planned PHNST - Confirmed Route



Map 11 Lakes at Red Rock HOA Realignment of Proposed PHNST Route



Northlake to Red Rock Overlook Park

At the current terminus of the existing PHNST at Northlake Boulevard, the original planned and confirmed route alignment has changed in consultation with the Lakes at Red Rock (LARR) Homeowners Association (shown in purple, (Map 11 on page 38).

As a result of the feasibility study and consultation with LARR, the 2021 LPAT Corridor (dark blue dashed) and 2022 PHNST Potential Route (yellow and light blue dashed) will be realigned to the purple route shown, but may be realigned again upon further coordination and confirmation with the HOA.

DESTINATIONS

Potential destinations associated with Potomac River heritage were identified from the LPAT Plan, Loudoun County GIS data, Visit Loudoun, and through public outreach. Potential destinations include:

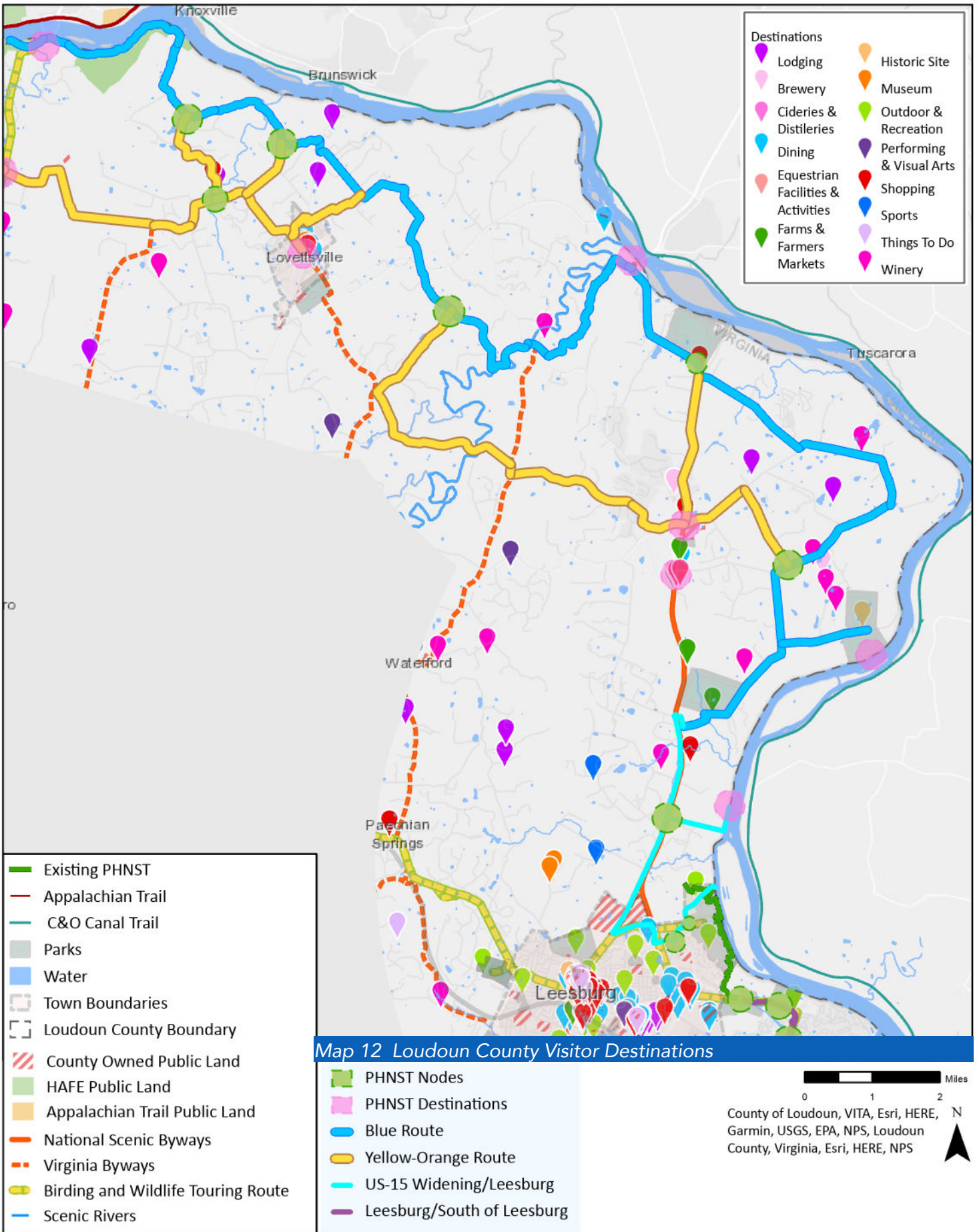
- Public lands with access to the Potomac River (as part of the water trail component of the PHNST) and potential trailhead locations
- Community identified destinations (e.g., Lovettsville, Lucketts)
- Craft beverage destinations open to the public (breweries and wineries)
- Hospitality destinations (lodging and restaurants)
- Farms and farmers markets
- Historic sites and museums
- Other visitor destinations

Water Trail

The Potomac River is a destination in and of itself forming the water trail component of the PHNST with existing water access points at Potoma Wayside near Harpers Ferry, Point of Rocks bridge, and at Piscataway Crossing Park. Future water access points are planned at the Town of Leesburg's Veterans Park and may be considered in the future at Springdale Park.



Figure 32 Lucketts, Virginia



COMMUNITY STAKEHOLDER SUGGESTED ROUTES

As part of the public outreach efforts, community stakeholders identified additional routes and requested that they be considered as part of the feasibility study.

The Potomac Heritage Trail Association (PHTA), a private organization whose mission is to complete, maintain, promote and celebrate the PHNST and connecting trails to it, recommends that a route through Waterford be considered as a near term route to provide a more immediate and usable alignment. The route follows the segments along the Potomac River to Georges Mill, Dutchman's Creek Road to Tollhouse Road crossing the Berlin Turnpike to Wenner and Quarter Branch roads. These segments are all incorporated into the feasibility study. The suggested route then splits following routes to Waterford, then Morven Park, and US 15 (red dashed line on Map 13 on page 42).

- VA 681 Slater to Orrison Road (includes discontinued segment)
- VA 673 Featherbed Lane
- *Service Road*
- *Public Road Amy's Meadow*
- VA 665 Loyalty Rd (gap)
- VA 662 Clover Hill Road
- VA 662 Town of Waterford
- VA 698 Old Waterford Road
- VA 755 Nestlewood Farm Lane (includes discontinued segments)
- VA 740 Tutt Lane

Additional segments were suggested as alternatives to Mountain Road connecting to Lovettsville (see Map 15 on page 45).

Another public outreach suggestion recommended creating a loop route between the US 340 and Brunswick bridges using the River Route around Short Hill Mountain.

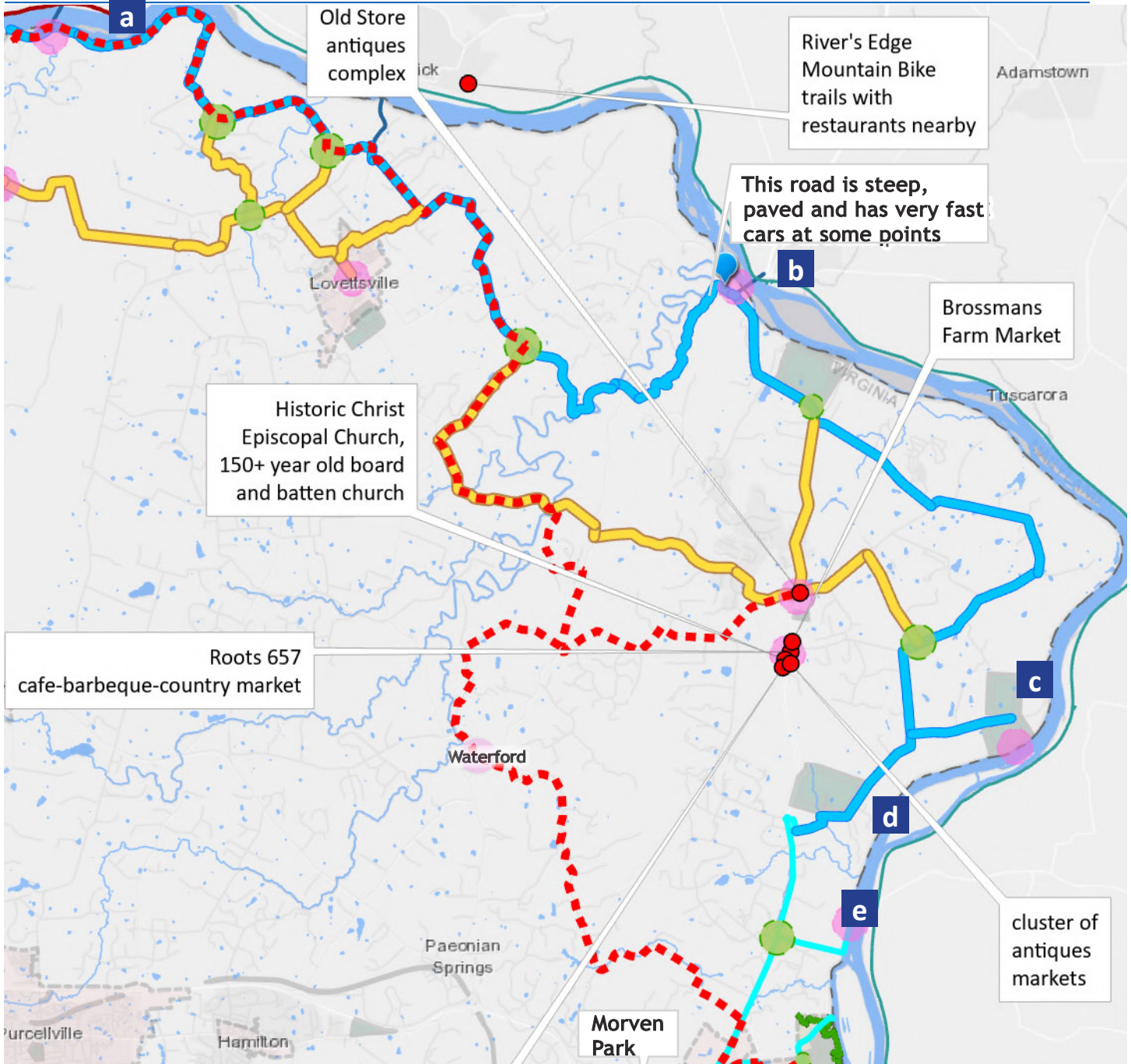
Waterford Route

The feasibility study incorporates portions of the PHTA recommended route from US 340/Potoma Wayside to Orrison Road and a portion of Featherbed Lane where the PHTA suggested route turns south toward Waterford connecting to Loyalty Road.

The feasibility study does not recommend pursuing the Waterford Route from Loyalty Road to Tutt Lane as the primary route of the PHNST (segments in italics, left).

The longer term goal for the PHNST is a separated natural surface trail along the Potomac River. River destinations b,c and d (Map 13 on page 42) would not be adjacent or near to the Waterford route. While the Waterford route has similar feasibility issues to the Lucketts and Taylortown routes (as defined by the PHTA suggested route description), expending comparable levels of effort to overcome similar issues on an interim route (private property issues/resolving discontinued road access, signing required for navigating the route's many turns, floodprone issues crossing tributary streams) would be better spent on resolving the more desirable routes closer to the river that can later be used for gravel bicycling options.

The Waterford route primarily follows the LPAT "Foothills Trail" corridor and should be considered as a "connecting or side trail" to the PHNST as per SEC. 6. [16USC1245] of the National Trail System Act.



Map 13 PHNST Community Suggested Routes and Destinations

Legend		PHNST Loudoun Route Segment Options		Community Feedback	
PHNST Status		PHNST Nodes	Cooperative Agreement Needed	Community Suggested Routes	Community Points of Interest
Existing PHNST	Planned PHNST - Confirmed Route	PHNST Destinations	Planned Connection/US 15 widening trail north of Tuscarora HS	Comments	 Esri, HERE, County of Loudoun, VITA, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA
Planned PHNST - Non-Feasible Route	Planned PHNST - Potential Route	PHNST Link	Trail parallel to roadway (on public land/ROW)		
Loudoun County Boundary		River option on gravel/low volume roads	Natural Surface - Federal Public Land		
		Inland option on gravel/low volume roads	Natural Surface - public land		
		River Paved On-Road Connection			
		Paved On-Road Connection			

WATER TRAIL DESTINATIONS

a Potoma Wayside



Figure 33 McKimney Boat Ramp at Point of Rocks bridge

b Point of Rocks

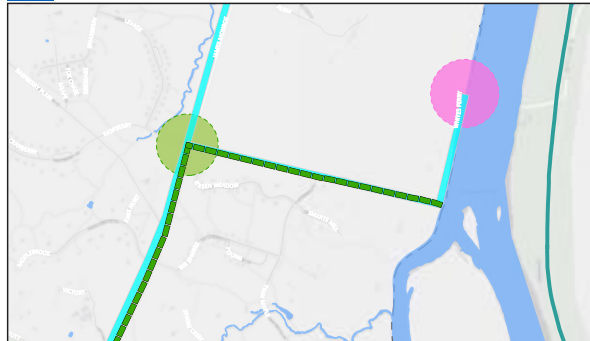


Figure 34 Piscataway Crossing Park (National Park Service | Monica Larcum)

c Piscataway Park (NOVA Parks)



d White's Ferry (currently closed)



e Veterans Park (opening 2025)



FEASIBILITY OF ELIGIBLE/RECOMMENDED ROUTE SEGMENTS

Trail segments are organized into three recommended routes shown on Map 13 on page 42:

- **Shoreline: Overland River Route** – generally follows the upper edge of the 500-year floodplain and would need to be established over time with cooperative agreements of private landowners. A specific corridor is not identified for this option except where identified in the LPAT.
- **Blue Route: Gravel Road/Low Volume River Route** – generally uses existing gravel roads and/or low volume roads (less than 400 Average Daily Traffic, or ADT) that are closest to the river.
- **Yellow/Orange Route** – in some cases the river route will require cooperative agreements with private landowners to make connections between existing road segments. This route provides inland options along low volume and/or gravel roads.

In some cases, along each of the eligible options, a higher volume paved road may need to be utilized to make the connections requiring mitigation to accommodate the anticipated trail user types. In other locations, an existing route has been discontinued and public access to that discontinued route will require confirmation. Preliminary research by volunteers identified these locations as having a high potential for continued public access but that access has to be confirmed by Loudoun County.

Map 15 on page 45 summarizes the results of the feasibility assessment based upon the criteria outlined starting on page 15. Detailed segment maps (see Map 14 for enlargement index) document the criteria that led to the feasibility conclusions.

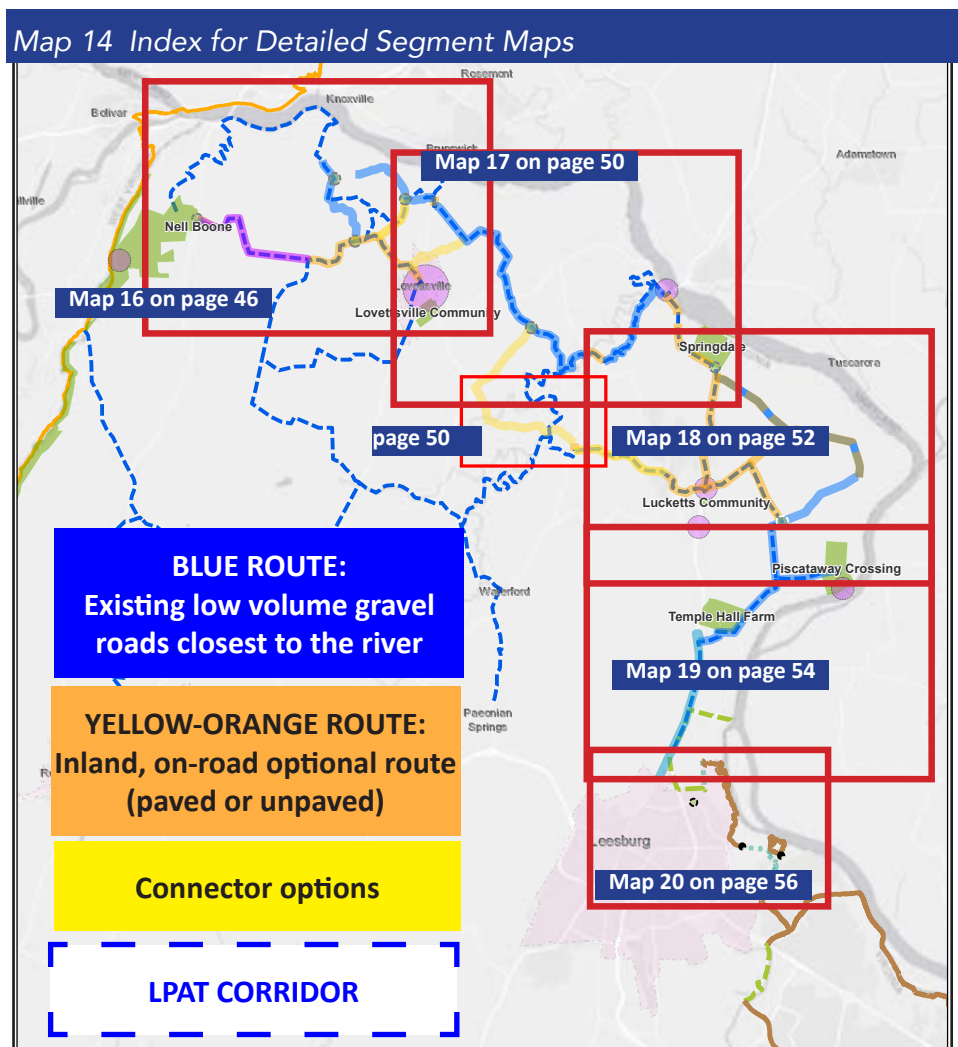
Each route segment has been evaluated using the evaluation criteria described starting on page 15. The relative feasibility of any route segment has been determined by the number of criteria that are met or mitigated (or not met). A preferred route can then be selected by comparing the total number of feasibility issues that are met for any given combination of segments.

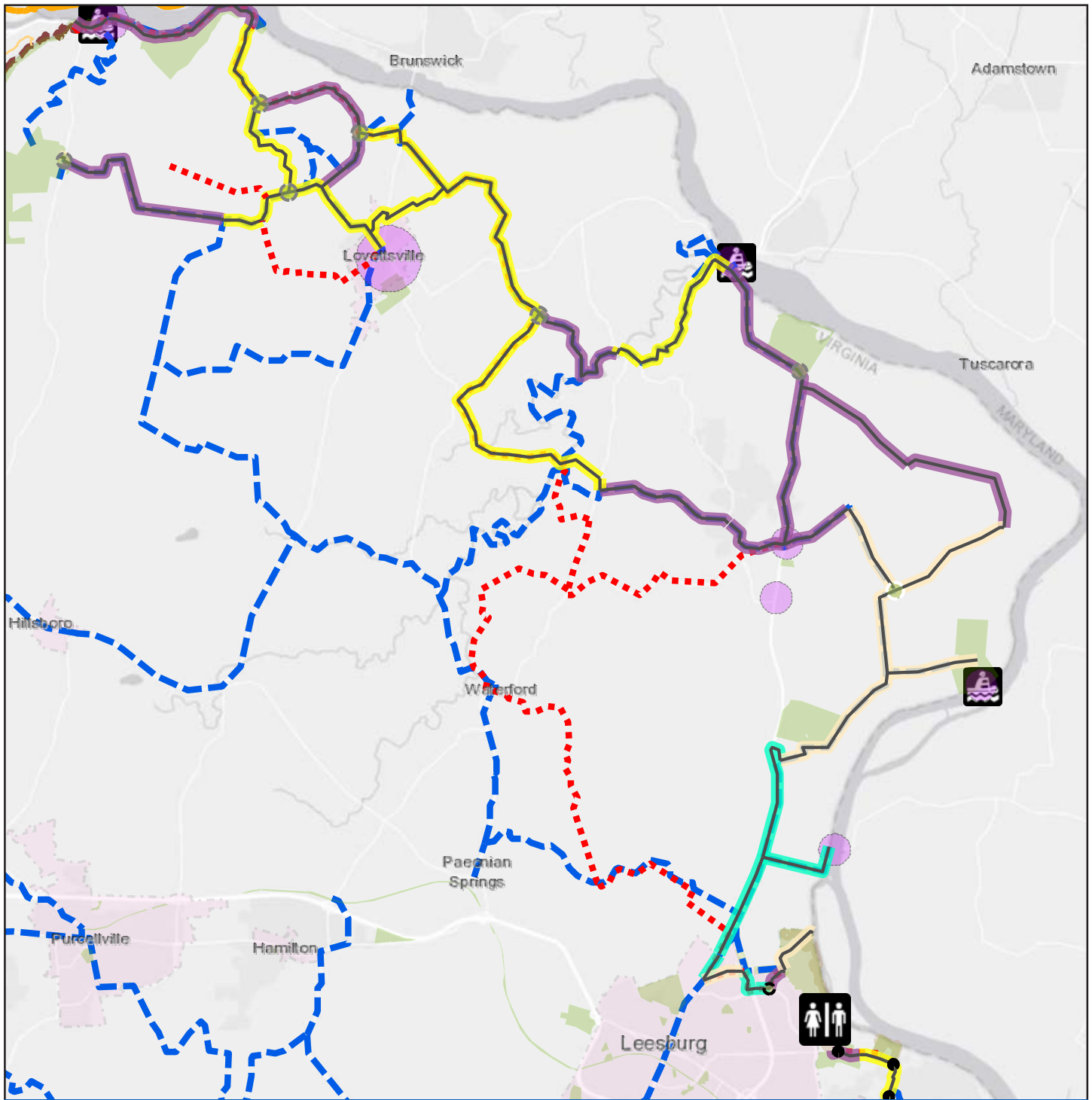
NOTE: overland corridors that require cooperative agreements (Criteria 2.3) are generalized indicating the number of private parcels that would need to be consulted. These are shown on the map enlargements (starting on page 46).

FEASIBILITY ANALYSIS

The following maps and tables summarize the results of the feasibility analysis.

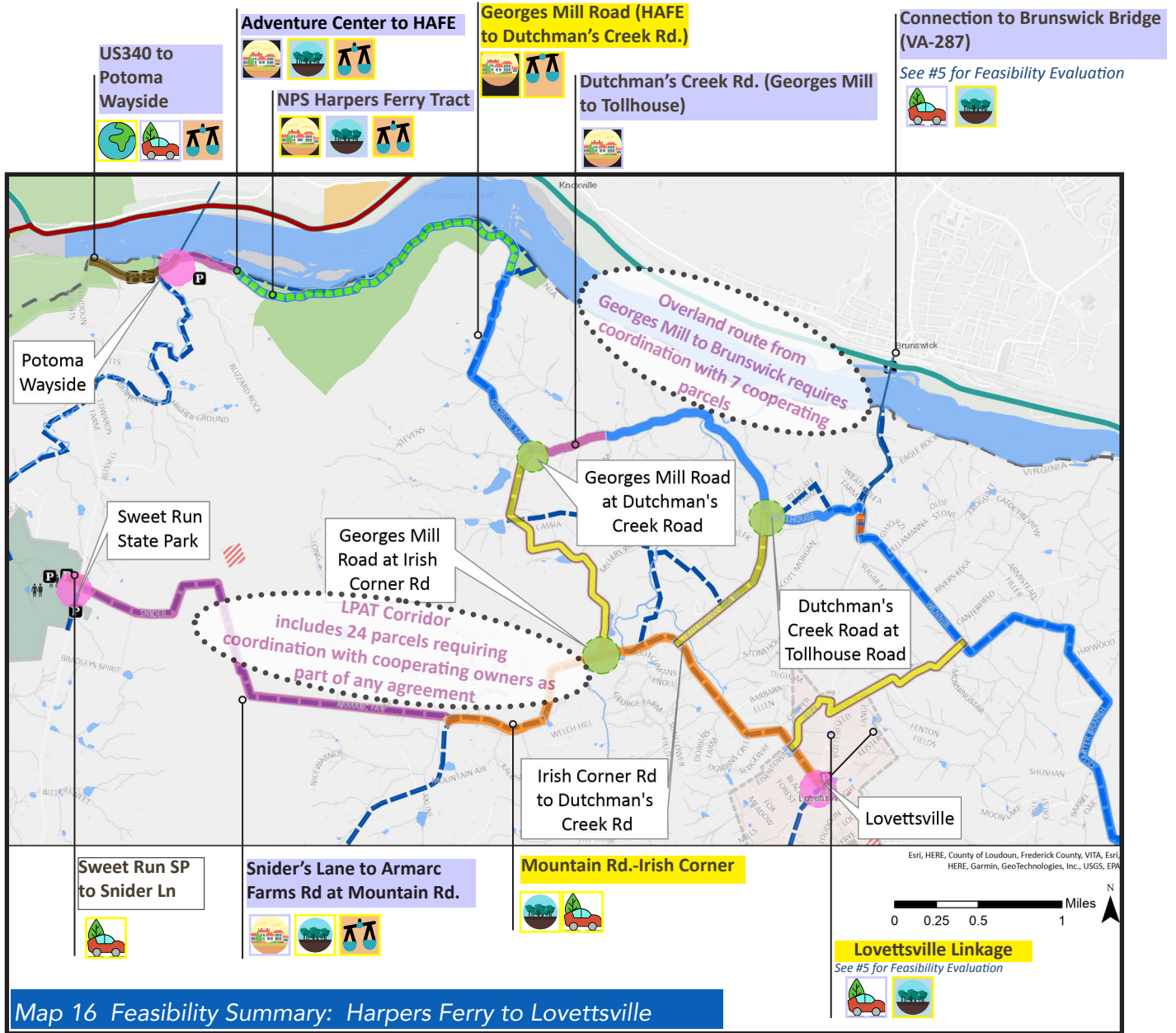
Appendix II contains enlarged and detailed maps and tables documenting the results of the feasibility analysis





Map 15 PHNST Feasibility of Eligible Route Segments

<ul style="list-style-type: none"> PHNST- eligible segment link PHNST Feasibility Findings Limited Feasibility US-15 Widening CIP and Town of Leesburg CIP Feasible with Conditions Feasible Community Input Route PHNST Community Input Destinations 	<ul style="list-style-type: none"> Parks LPAT Corridors Existing PHNST Planned PHNST - Potential Route Planned PHNST - Confirmed Route NVRC Hand Carry Boat Launches Appalachian Trail 	<div style="text-align: center;"> </div> <div style="text-align: center;"> </div> <p style="text-align: center; font-size: small;">Esri, HERE, NPS, Esri, HERE, Garmin, USGS, EPA, NPS</p>
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Map 16 Feasibility Summary: Harpers Ferry to Lovettsville

Legend

-  Appalachian Trail
-  C&O Canal Trail
-  LPAT Trail Corridors
-  Bridge Deck
- Existing Trailhead Amenities
-  Public Restrooms
-  Parking

PHNST Loudoun Road Segment Options

-  PHNST Nodes
-  Node
-  Destination
- PHNST Link
-  River option on gravel/low volume roads
-  Inland option on gravel/low volume roads
-  River Paved On-Road Connection
-  Paved On-Road Connection
-  Cooperative Agreement Needed
-  Trail parallel to roadway (on public land/ROW)
-  Natural Surface - Federal Public Land
-  Natural Surface - public land









-  Functional/Safety Issues
-  Resource Issues
-  Land Ownership/Funding Issues
-  Sustainability/Management Issues
-  Significance Issues

Table 2 PHNST: Harpers Ferry to Lovettsville

	Feasibility issues that must be addressed	Conditions affecting trail cost and suitability	Overall Feasibility
Blue Route: Closest public access to Potomac River			
US 340 to Potoma Wayside	<ul style="list-style-type: none"> Separation from Traffic (US 340) Area of Concern (VA 671 @ US 340) \$\$\$ Significant premium costs 	<ul style="list-style-type: none"> Involves federal funding or property Connecting route to LPAT corridor 	<i>Limited feasibility if functional and safety issues on US 340 can be addressed along with parking and access at Potoma Wayside</i>
Adventure Center to Harpers Ferry Tract	<ul style="list-style-type: none"> Private landowners (2 parcels) 	<ul style="list-style-type: none"> \$\$ Premium trail costs 	<i>Limited feasibility with cooperative agreement</i>
NPS Harpers Ferry Tract	<ul style="list-style-type: none"> Ecological sensitivity (C2) \$\$\$ Premium costs associated with trail design in sensitive area and operational issues (trailhead and staffing) 	<ul style="list-style-type: none"> Avoid 500-year flood elevation Tributary wetland/streams crossing Steeply sloping lands immediately adjacent to 500 year floodplain Phase 1 Cultural Resources Study 	<i>Limited feasibility with NPS management agreement, trailhead and staffing support and high quality/ low impact trail design</i>
Georges Mill Rd from NPS HAFE to Irish Corner Road	<ul style="list-style-type: none"> ROW at boundary between NPS/ HAFE and Georges Mill Road needs clarification 	<ul style="list-style-type: none"> Portions of road are floodprone Access, parking and ROW Trailhead/NPS operations issues \$\$ Premium trail costs 	<i>Feasible if ROW can be resolved with cooperative trailhead development on HAFE tract</i>
Dutchman’s Creek Road (Georges Mill to Tollhouse)	<ul style="list-style-type: none"> 2 parcels requiring cooperative agreements (or ROW clarification) 	<ul style="list-style-type: none"> Crosses floodprone lands 	<i>Limited feasibility with cooperative agreement or ROW clarification</i>
Inland Alternate Route			
Sweet Run State Park to Snider’s Lane		<ul style="list-style-type: none"> Coordinate crossing of VA 671 with VDCR entry relocation; add safety countermeasures 	<i>Feasible</i>
Snider’s Lane to Armarc Farms Road at Mountain Road	<ul style="list-style-type: none"> 24 parcels requiring cooperative agreements 	<ul style="list-style-type: none"> Sustainable alignment through cooperative agreements needed Rural residential uses along route 	<i>Limited feasibility if cooperative agreements can be achieved along a sustainable trail alignment</i>
Mountain Road to Irish Corner Road to Georges Mill Road intersection		<ul style="list-style-type: none"> Portions of Mountain Road are floodprone Paved on-road route with limited shoulder 	<i>Feasible if on-road safety countermeasures can be installed along Mountain Road (shoulder modifications at next repavement)</i>
Connection to Brunswick Bridge			
Berlin Turnpike	<ul style="list-style-type: none"> New trail would have to share travel lanes, use existing >4’ sidewalk, build new separated bridge, or build new cantilever structure on existing bridge (AADT 7500) 	<ul style="list-style-type: none"> Floodprone lands and steep embankments on approach route to bridge 	<i>Limited feasibility if bridge trail and approach traffic safety issues can be resolved as part of future bridge projects</i>

Table 3 Short Hill Mountain River Route Versus Mountain Route Comparison (segment length with limited feasibility)

	LEVEL 1 Criteria - Significance	River Route (mi)	Mountain Route (mi)	
	1.1	Segment is in general conformance with the National Trail System Act	√	√
	1.2	Segment supports the purpose and significance statement for the PHNST	√	√
	1.3	Segment meets administrative criteria for acceptance into the PHNST system	√	√
	LEVEL 2 Criteria - Land Ownership and Funding Sources			
	2.1	Segments do not involve federal lands and funding	2.7	√
	2.2	Segments are in general conformance with the Loudoun Linear Parks and Trails Plan (LPAT)	1.8	√
	2.3	Segments do not involve private land through cooperative partnership	2.2 (7 parcels)	2.9 (24 parcels)
	LEVEL 3 Criteria - Trail Specific Criteria			
	Trail Experience Issues			
	3.1	Segment is within visual corridor or provides direct connecting route to Potomac River	√	5.7
	3.2	Provides direct access between PHNST destination as identified in NVRC Corridor Analysis, LPAT, or other Loudoun County planning documents	√	√
	3.3	Enhances outdoor recreation potential/user type served	√	√
	3.4	Enhances relevance, access, and participation on national trails for traditionally underrepresented and underserved communities	~	~
	3.5	Provides alternate or braided trail experience for user types that may not be suitable for use on the designated route	2.1	2.3
	Resource Issues			
	3.6	Avoids or minimizes impacts to flood prone lands	3.1	0.1
	3.7	Avoids or minimizes impacts to wetlands	3.1	0.1
	3.8	Avoids or minimizes impacts to excessively sloping land	6.2	2.9
	3.9	Avoids or minimizes impacts to areas identified by VDCR as Ecological Cores	3.1	2.9
	3.10	Avoids or minimizes impact to areas with high potential for historic resource	4.4	√
	Functional/Safety Issues			
	3.11	Avoids or mitigates traffic safety/areas of concern	.6	1.2
	3.12	Avoids or mitigates traffic conflict points/intersections	√	1.2
	3.13	Provides greater separation from vehicles or lower roadway volume	~	1.2
	3.14	Compatible with adjoining land use	~	~
	Sustainability/Management Issues			
	3.15	Management entity and responsibility	~	~
	3.16	Trail Segment is supported by visitor infrastructure such as parking and restroom	5.2	2.7
	3.17	Trail segment can be designed using sustainable design principles	~	~
	3.18	Trail segment avoids or minimizes premium costs (trail construction)	4.4	~

Comparison of River Route and Mountain Route

One of the more challenging issues for completing the PHNST gap in western Loudoun County is how best to traverse Short Hill Mountain and connect to the Appalachian Trail and/or the US 340 Bridge over the Potomac River. Table 3 on page 48 provides a direct comparison of the route segments with limited feasibility that must be overcome prior to further consideration

Level 1 Criteria

Both the River Route and Mountain Route options meet all of the Level 1 criteria for significance.

Level 2 Criteria

Federal involvement: The river route must address the requirements and administrative complexity of traversing a trail over federal lands and likely involving federal funding. The river route segment to the west of the Potomac Wayside on the south side of US 340 will likely require federal funds.

Private property: Both route options must address the need to work cooperatively with private property, with the River Route having less segment length and fewer property owners.

Level 3 Criteria

Trail experience: While both options provide quality trail experiences for a range of trail user types, the river route provides both visual and physical connections to the Potomac River.

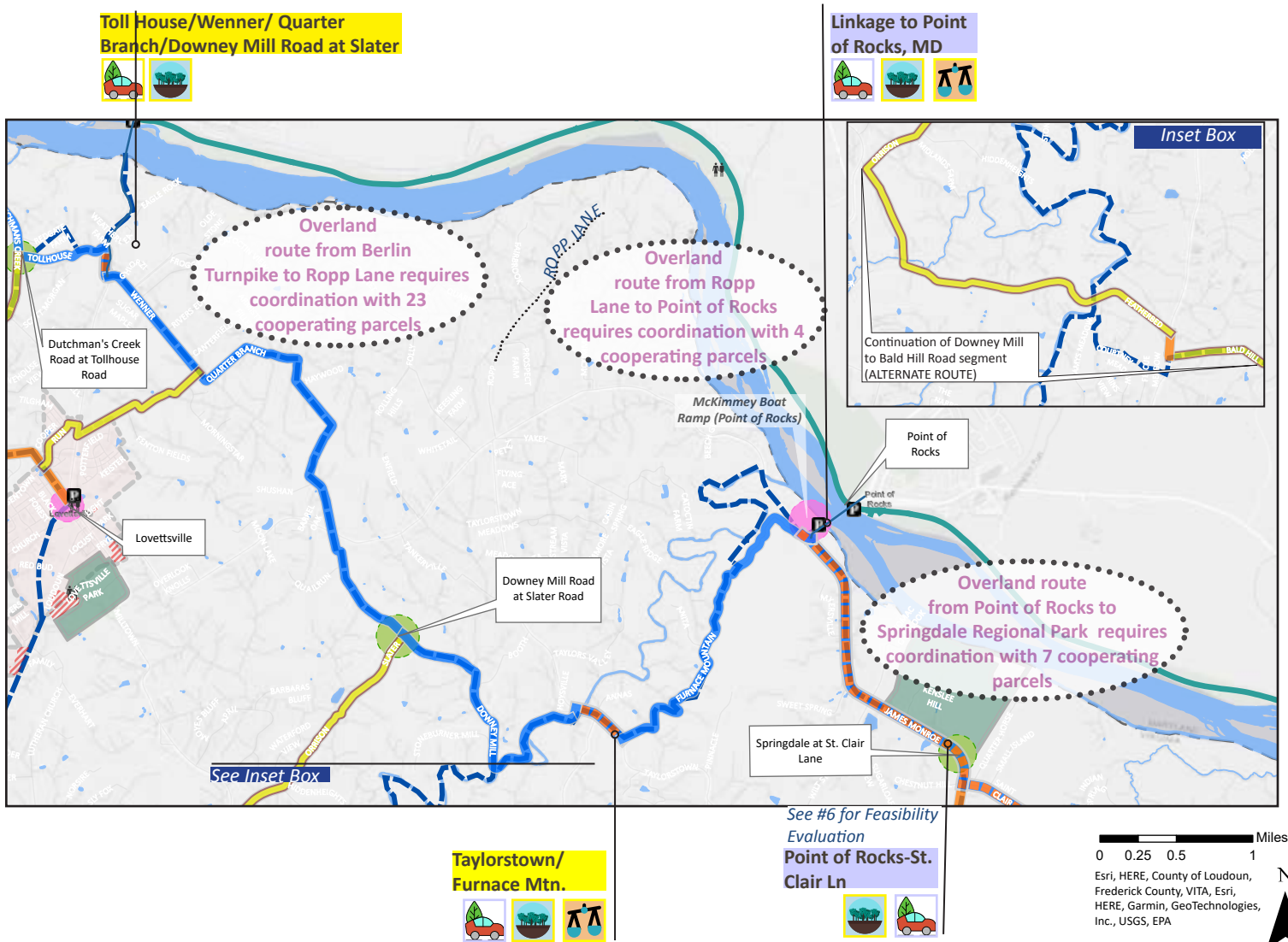
Resource issues: The mountain route will be less impactful relative to the resource issues incorporated into the evaluation criteria. The biggest challenge of the river route is finding a trail route between the flood prone lands and the adjoining steep slopes. By avoiding the floodplains and steep slopes, the trail corridor would need to go deeper into the ecological cores.

Functional/Safety Issues: The river route is generally separated from traffic and requires one crossing of a major intersection. The mountain route crosses one moderate-high volume road and must utilize a paved road for a significant portion of the route. Both have similar compatibility issues with adjoining land uses that can be managed through design interventions.

Sustainability/Management Issues: The river route is not generally served by public parking or restrooms, but nearby private businesses can support the trail. The mountain route is supported by Sweet Run State Park, but once over the mountain the nearest facilities are in Lovettsville. Both options can be built as sustainable trails, but the mountain route might require more private property use with cooperative agreements.

The choice between a river route and mountain route is between:

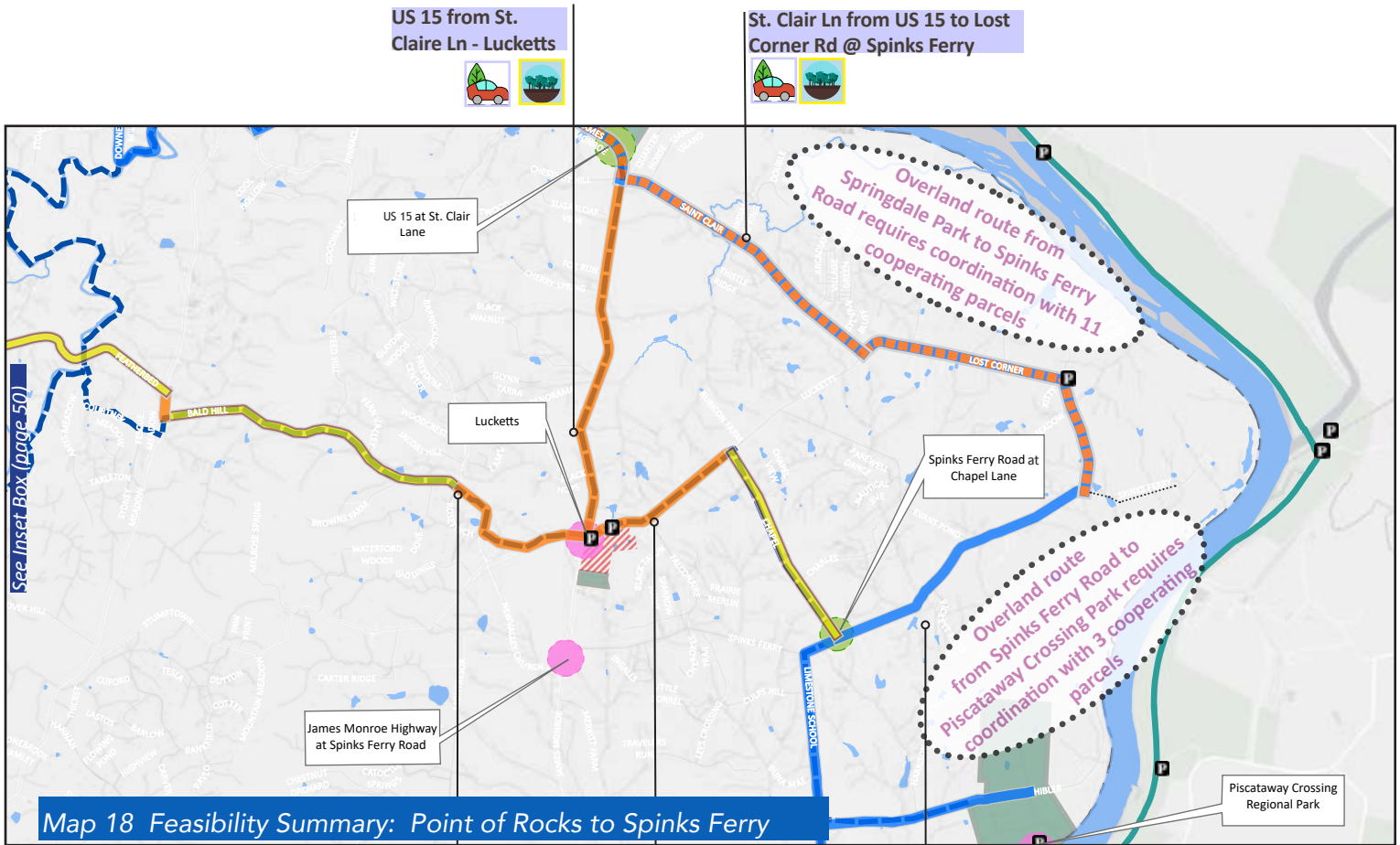
- *A river route that would be a more attractive trail experience, but requires federal involvement, cooperation of two landowners, more costly trail building to avoid resource impacts, and additional operational costs incurred.*
- *A mountain route that requires more extensive cooperation with private landowners (including the need for a more sustainable alignment that does not follow parcel lines) and the need to address a trail alignment on a paved surface where vehicles travel at a higher speeds*



Map 17 Feasibility Summary: Lovettsville to Point of Rocks

<p>Legend</p> <ul style="list-style-type: none"> Appalachian Trail C&O Canal Trail LPAT Trail Corridors Bridge Deck Existing Trailhead Amenities Public Restrooms Parking 	<p>PHNST Loudoun Road Segment Options</p> <ul style="list-style-type: none"> Node Destination PHNST Link River option on gravel/low volume roads Inland option on gravel/low volume roads River Paved On-Road Connection 	<ul style="list-style-type: none"> Paved On-Road Connection Cooperative Agreement Needed Trail parallel to roadway (on public land/ROW) Natural Surface - Federal Public Land Natural Surface - public land 	<ul style="list-style-type: none"> Functional/Safety Issues Resource Issues Land Ownership/Funding Issues Sustainability/Management Issues Significance Issues
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Table 4 Feasibility Summary: Lovettsville to Point of Rocks			
	Feasibility issues that must be addressed	Conditions affecting trail cost and suitability	Overall Feasibility
River Route: Toll House Road to Point of Rocks			
Toll House Road to Wenner Road to Quarter Branch Road to Downey Mill Road at Slater	<ul style="list-style-type: none"> Requires crossing accommodation for pedestrian and bicycle use crossing Berlin Turnpike -not identified on Sidewalk and Shared Use Path Prioritization Maps 	<ul style="list-style-type: none"> Portions of Tollhouse Road floodprone with adjoining wetlands; Portions of Quarterhorse Road on steep profiles Phase 1 Cultural Resources Study (portion) CRPI = 1 	Feasible, if pedestrian and bicycle accommodations can be installed to facilitate crossing Berlin Turnpike
Downey Mill Road (at Slater) to Taylorstown Road to Furnace Mountain Road to Lovettsville Road @ POR		<ul style="list-style-type: none"> Portions of Downey Mill Rd. and Taylorstown Road floodprone Furnace Mountain Road on steep profiles with side slopes Phase 1 Cultural Resources Study (portion) CRPI = 2 Taylorstown and Furnace Mtn. Road traffic safety issues \$\$ Roadway and bridge work at Taylorstown Rd. 	Feasible, if crossing of Catoctin Creek can be accommodated with separated pedestrian/bicycle bridge and drainage and safety measures on Furnace Mountain Road can be implemented; road use would need to be signed with advisory plaques for blind vertical and horizontal curves
Linkage to Lovettsville			
Irish Corner Road from Dutchman’s Creek Road to Broadway and Lovettsville (Map 16 on page 46)	<ul style="list-style-type: none"> Safety dependent on pedestrian and bicycle accommodations for moderate volume road (ADT 1900) - not identified on Sidewalk and Shared Use Path Prioritization Maps 	<ul style="list-style-type: none"> Portions of Irish Corner Road and Dutchman’s Creek floodprone Phase 1 Cultural Resources Study (portion) CRPI = 2 \$\$ Ped/bike facilities needed on moderate volume road 	Limited Feasibility if pedestrian and bicycle accommodations can be retrofitted into existing road (shared roadway or bicycle lanes and sidewalks)
Broadway to Cooper Run to Tilgham Place to Quarter Branch to Wenner	<ul style="list-style-type: none"> Ped/bike facilities needed to cross on Berlin Turnpike - not identified on Sidewalk and Shared Use Path Prioritization Maps 	<ul style="list-style-type: none"> Phase 1 Cultural Resources Study (portion) CRPI = 2 	Feasible, if pedestrian and bicycle accommodations can be installed to facilitate crossing Berlin Turnpike
Linkage to Point of Rocks			
US 15 from Lovettsville Road to Point of Rocks Bridge (MD)	<ul style="list-style-type: none"> Existing bridge deck does not have width to accommodate a trail facility (Maryland owns the bridge); federal funding likely to be required for modifications 	<ul style="list-style-type: none"> Bridge is historic with deed language to include sufficient restrictions toward preservation of those resources, per the VA Dept of Historic Resources. 	Limited feasibility if bridge crossing and approach traffic safety issues can be resolved as part of future bridge projects
Inland Alternate Route			
Slater Road at Downey Mill to Orrison Road to Featherbed Lane to Loyalty at Bald Hill Road	<ul style="list-style-type: none"> Slater and Orrison connection may affect residential property; privacy issue and require easement 	<ul style="list-style-type: none"> Crosses floodplain of Milltown Creek and Catoctin Creek Steep profile grade sections of gravel roads at creek crossings Phase 1 Cultural Resources Study (portion) CRPI = 1 & 2 	Feasible, if cooperative agreement can be obtained for Slater and Orrison connection (or deed research establishing ROW status)



Map 18 Feasibility Summary: Point of Rocks to Spinks Ferry

Bald Hill Rd. from Loyalty to New Valley Church Rd. to Stumptown Rd. to Lucketts



Lucketts Rd. from US 15 to Chapel Lane



Spinks Ferry from Lost Corner to Chapel Ln

0 0.25 0.5 1 Miles

Esri, HERE, County of Loudoun, Frederick County, MNCPPC, VITA, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA



Legend

- Appalachian Trail
- C&O Canal Trail
- LPAT Trail Corridors
- Bridge Deck
- Existing Trailhead Amenities
 - Public Restrooms
 - Parking

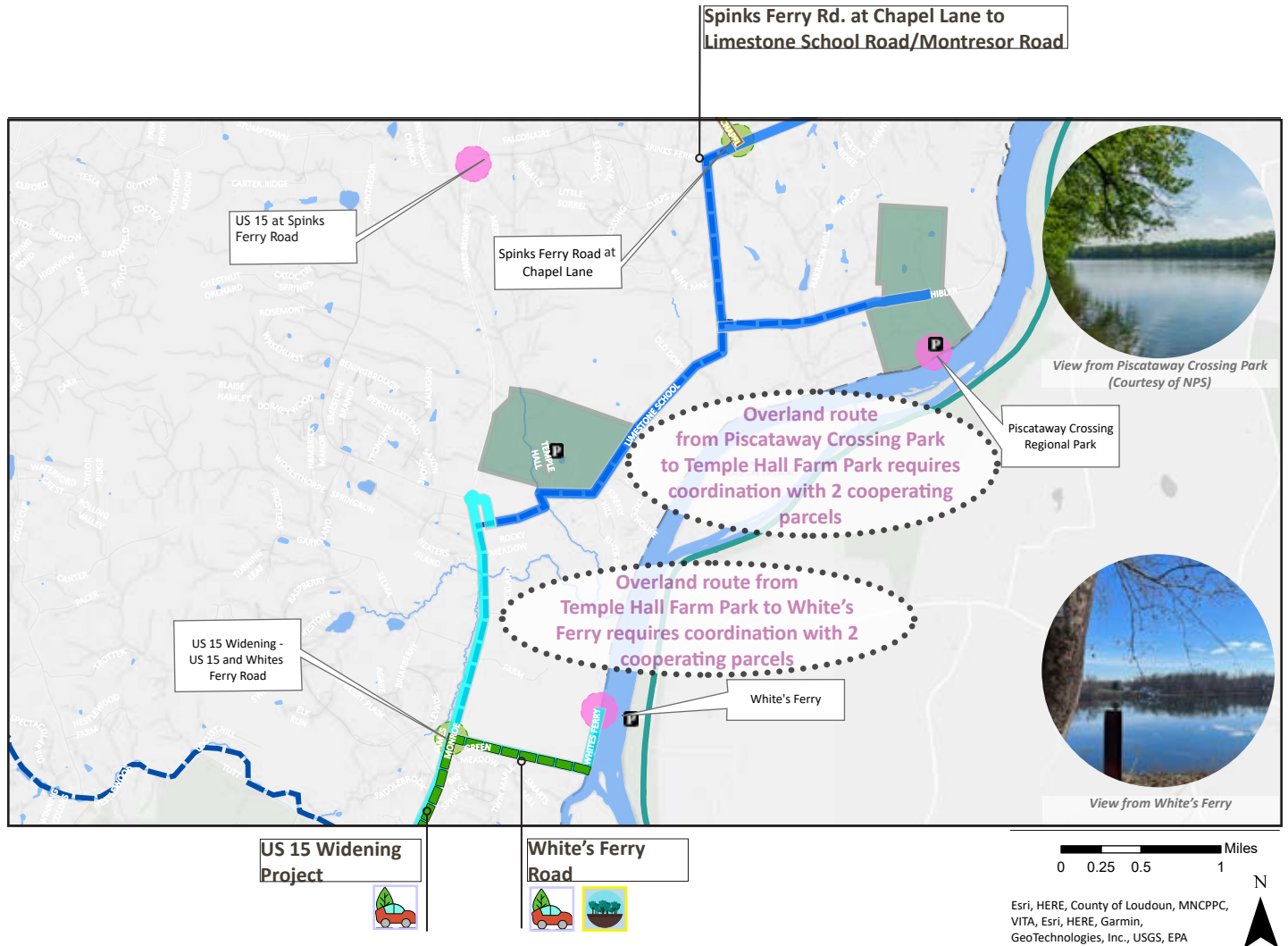
PHNST Loudoun Road Segment Options

- PHNST Nodes
 - Node
 - Destination
- PHNST Link
 - River option on gravel/low volume roads
 - Inland option on gravel/low volume roads
 - River Paved On-Road Connection
- Paved On-Road Connection
 - Cooperative Agreement Needed
 - Trail parallel to roadway (on public land/ROW)
 - Natural Surface - Federal Public Land
 - Natural Surface - public land

- Functional/Safety Issues
- Resource Issues
- Land Ownership/Funding Issues
- Sustainability/Management Issues
- Significance Issues

Table 5 Feasibility Summary: Point of Rocks to Spinks Ferry

	Feasibility issues that must be addressed	Conditions affecting trail cost and suitability	Overall Feasibility
Blue Route: Point of Rocks to Spinks Ferry Road at Chapel Lane			
US 15 from Lovettsville Road to St. Clair Lane (see Map 17 on page 50)	<ul style="list-style-type: none"> Separation from US15 required (Segments 6A and 6B ranked 905 and 1067 respectively on Sidewalk and Shared Use path prioritization ROW constrained on east side from Meyers Road to Potomac Overlook Ln (0.5 miles/11 parcels) 	<ul style="list-style-type: none"> Portions within floodprone and wetland areas Phase 1 Cultural Resources Study entire corridor CRPI = 2 \$\$\$ major trail construction project and likely ROW or easements needed 	<i>Limited feasibility if cooperative agreements can be achieved to establish a separated multi-use trail along US 15 or alternatively an overland route connecting to Springdale Park</i>
St. Claire Lane from US 15 to Lost Corner Road at Spinks Ferry Road	<ul style="list-style-type: none"> Narrow pavement, speed > 35mph w/no shoulders ROW constrained for sidepath entire length (19 parcels using less dense side) 	<ul style="list-style-type: none"> Crossing of floodprone areas over existing culvert Phase 1 Cultural Resources Study entire corridor CRPI = 2 Sidepath requires modifications to roadway, easements \$\$\$ roadway modifications for sidepath 	<i>Limited feasibility if cooperative agreements can be achieved to establish a separated side path</i>
Spinks Ferry Road from Lost Corner Road to Chapel Lane		<ul style="list-style-type: none"> Crossing of floodprone areas over existing culvert Phase 1 Cultural Resources Study entire corridor CRPI = 2 	<i>Feasible as gravel road bicycling and equestrian route</i>
Inland Alternate Route: Springdale to Lucketts			
US 15 from St. Clair Lane to Lucketts	<ul style="list-style-type: none"> Development of sidepath with adequate separation from US15 required (US 15 Segment 6B is ranked 1067 and Segment 155A approaching Lucketts is ranked 672 on Sidewalk and Shared Use Path Prioritization 	<ul style="list-style-type: none"> Floodprone at three tributaries of Clark’s Run; associated wetlands Phase 1 Cultural Resources Study entire corridor CRPI = 2 \$\$\$ major trail construction project and likely ROW or easements needed, plus four bridges or bridge modifications 	<i>Limited feasibility if cooperative agreements can be achieved to establish a separated side path</i>
Inland Alternate Route: Downy Mill to Spinks Ferry Road at Chapel Lane (continued)			
Bald Hill Road from Loyalty to New Valley Church Road to Stumptown Road to Lucketts (continues from Map 17 on page 50)	<ul style="list-style-type: none"> Moderate volume on New Valley Church Road and Stumptown Rd. (with narrow paved lane width and no shoulders) 	<ul style="list-style-type: none"> Stumptown Rd. floodprone lands with associated wetlands Steep grade gravel roads and embankments along Bald Hill Road Portion may require Phase 1 Cultural Resources Study CRPI = 2 \$\$ easement to provide sidepath + shoulders on paved sections 	<i>Limited feasibility if cooperative agreements can be achieved to establish a separated side path</i>
Lucketts Road from US 15 to Chapel Lane	<ul style="list-style-type: none"> High speed moderate volume road with clusters of traffic incidents and no pedestrian or bicycle facilities - sidepath needed 	<ul style="list-style-type: none"> Crossing of floodprone areas over existing culvert Phase 1 Cultural Resources Study entire corridor CRPI = 2 	<i>Limited feasibility if cooperative agreements can be achieved to establish a separated side path</i>

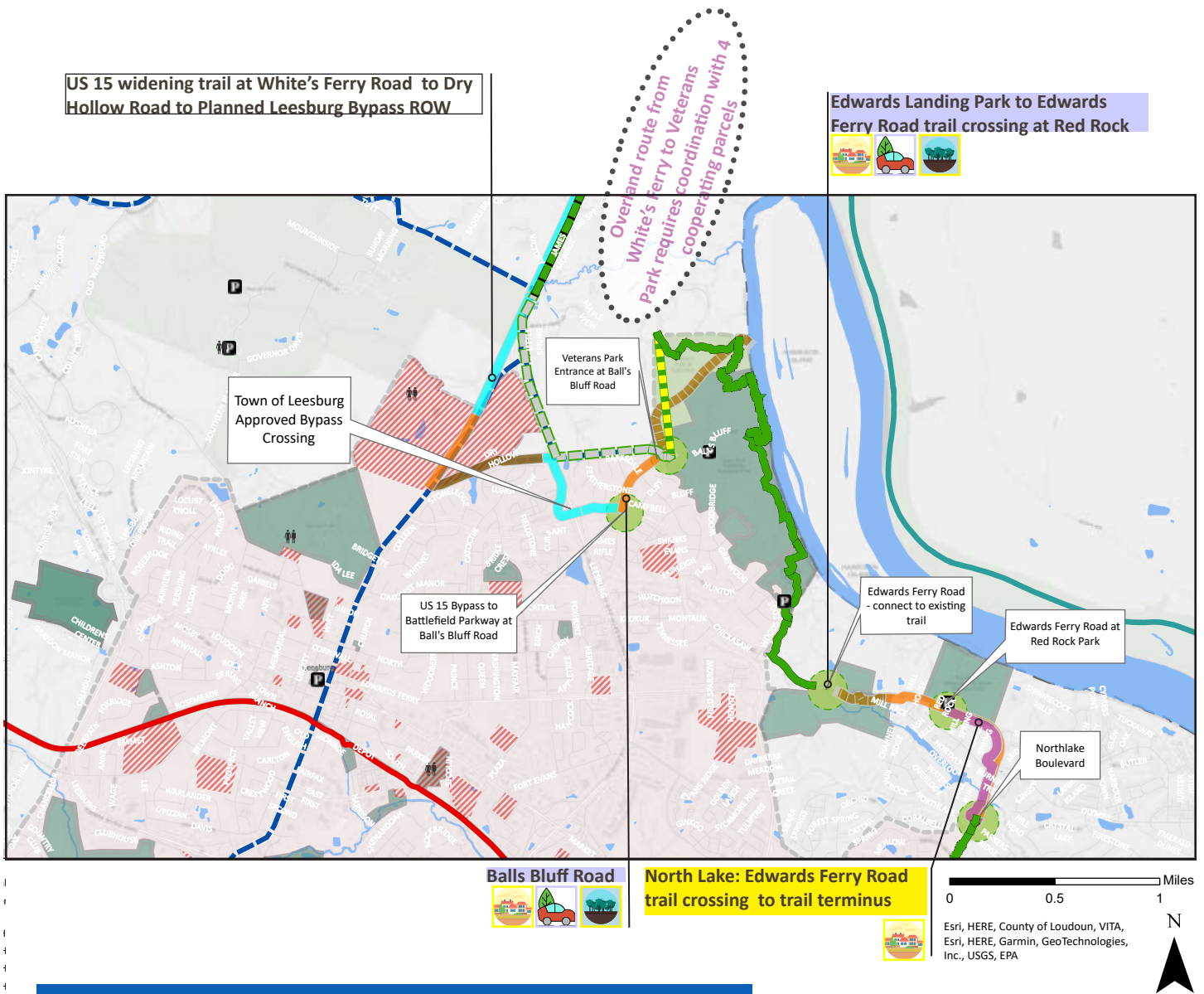


Map 19 Feasibility Summary: Spinks Ferry to White's Ferry

Legend		PHNST Loudoun Road Segment Options		Issues	
	Appalachian Trail		PHNST Nodes		Functional/Safety Issues
	C&O Canal Trail		Node		Cooperative Agreement Needed
	LPAT Trail Corridors		Destination		Trail parallel to roadway (on public land/ROW)
	Bridge Deck		PHNST Link		Natural Surface - Federal Public Land
	Existing Trailhead Amenities		River option on gravel/low volume roads		Natural Surface - public land
	Public Restrooms		Inland option on gravel/low volume roads		
	Parking		River Paved On-Road Connection		

Table 6 PHNST: Spinks Ferry to White’s Ferry

	Feasibility issues that must be addressed	Conditions affecting trail cost and suitability	Overall Feasibility
Blue Route: Spinks Ferry Road at Chapel Lane to US 15 at White’s Ferry Road			
Spinks Ferry Road at Chapel Lane to Limestone School Road/Montresor Road planned roundabout		<ul style="list-style-type: none"> Crossings (2) of floodprone areas over existing culvert and bridge 	Feasible as gravel road bicycling and equestrian route
US 15 widening trail from Montresor Road planned roundabout to White’s Ferry Road	<ul style="list-style-type: none"> US 15 widening project addresses safety issues with shared use path Modifications required to roundabout design to accommodate ped/bike use at Montresor/US 15 intersection 		Feasible as paved multi-use pathway incorporated into the US 15 Widening Capital Project.
Connection to Piscataway Park (water access)			
Hibler Road from Limestone School Road Intersection to Piscataway Park		<ul style="list-style-type: none"> Crossing of floodprone Potomac tributary areas over existing culvert Phase 1 Cultural Resources Study entire corridor CRPI = 2 	Feasible as gravel road bicycling and equestrian route
Connection to White’s Ferry			
White’s Ferry Road to Ferry Landing	<ul style="list-style-type: none"> US widening project addresses safety issues with shared use path US widening project addresses safety of US 15/White’s Ferry Road intersection crossing 	<ul style="list-style-type: none"> Portions within floodprone area 	Feasible as paved multi-use pathway incorporated into the US 15 Widening Capital Project.



Map 20 Feasibility Summary: White's Ferry to Northlake

Legend		PHNST Loudoun Road Segment Options		Functional/Safety Issues	
	Appalachian Trail		PHNST Nodes		Functional/Safety Issues
	C&O Canal Trail		Node		Resource Issues
	LPAT Trail Corridors		Destination		Land Ownership/Funding Issues
	Bridge Deck		PHNST Link		Sustainability/Management Issues
	Existing Trailhead Amenities		River option on gravel/low volume roads		Significance Issues
	Public Restrooms		Inland option on gravel/low volume roads		
	Parking		River Paved On-Road Connection		
			Trail parallel to roadway (on public land/ROW)		
			Natural Surface - Federal Public Land		
			Natural Surface - public land		

Table 7 PHNST: White's Ferry to Northlake

	Feasibility issues that must be addressed	Conditions affecting trail cost and suitability	Overall Feasibility
US 15 at White's Ferry Road to Veterans Park			
US 15 widening trail at White's Ferry Road to Dry Hollow Road to Planned Leesburg Bypass ROW	<ul style="list-style-type: none"> US 15 widening project addresses safety issues with shared use path 	<ul style="list-style-type: none"> Convert old road bed to trail 	Feasible as paved multi-use pathway as incorporated into the US 15 Widening Capital Project and along Dry Hollow Rd.
Planned Leesburg Bypass ROW to Battlefield Parkway crossing at Balls Bluff Road intersection	<ul style="list-style-type: none"> Leesburg Bypass Capital Project addresses safety issues with overpass crossing and shared use path along approaches 		Feasible as paved multi-use pathway incorporated into the Leesburg Bypass Battlefield Parkway Crossing Capital Project
Balls Bluff Road to Veterans Park (master plan entrance drive)	<ul style="list-style-type: none"> Coordination with HOA required \$\$\$ HOA asphalt path needs to be widened which would require modifications to roadway 	<ul style="list-style-type: none"> Phase 1 Cultural Resources Study entire corridor CRPI = 2 	Limited feasibility if cooperative agreement with HOA can be achieved to convert existing asphalt path to a wider side path
Edwards Ferry Road (from existing trail) to Northlake Boulevard (to existing trail terminus)			
Edwards Landing Park to Edwards Ferry Road trail crossing	<ul style="list-style-type: none"> Edwards Ferry Road (>5000 ADT); separated shared use path needed along Edwards Ferry Road, or alternate bicycle route Cluster of incidents on Edwards Ferry Road \$\$\$ modifications to Edwards Ferry Road for 	<ul style="list-style-type: none"> Phase 1 Cultural Resources Study entire corridor CRPI = 2 	Limited feasibility if modifications can be made to accommodate bicycles and pedestrians: <ul style="list-style-type: none"> wider shoulders or alternatively shared use path on public land (north side) and with easements or alternatively NOVA Parks, accommodates paved shared use path (south side) at Cattail Branch (requires bridges for crossing of tributaries and wetlands)
Edwards Ferry Road trail crossing to trail terminus (HOA cooperative use required)	<ul style="list-style-type: none"> Edwards Ferry Road and River Creek Parkway (>5000 ADT); separated achieved as if cooperative agreement with HOA can be reached to separate trail from high volume roadway 	<ul style="list-style-type: none"> Phase 1 Cultural Resources Study entire corridor if federal funds used CRPI = 2 \$\$ contour trail alignment needed to avoid steep slopes and embankments 	Feasible as paved multi-use pathway if cooperative agreement can be reached with HOA for use of wooded area between River Creek Parkway and overhead electric transmission line

RESOLVING FEASIBILITY ISSUES

The following is a compilation of ideas and suggestions for resolving the issues associated with route segments having limited feasibility. These issues must be address prior to moving forward with further trail planning, design and implementation.

DISCONTINUED OR ABANDONED ROADS

There are several segments that require resolution or confirmation of road abandonments versus roads that are discontinued. PHTA has provided background research indicating that some of these road segments have been abandoned, but not discontinued. If abandoned, it may be possible to reopen the original right-of-way as a trail segment. Confirmation of the status of these discontinued or abandoned routes is needed from Loudoun County. The top segments requiring confirmation of the status of the ROW include:

- Status of the right-of-way providing access to the Harpers Ferry (HAFE) tract managed by the National Park Service
 - Discontinued River Road between US 340 bridge and HAFE
 - Discontinued Georges Mill Road
- Discontinued Dutchman's Creek Road
- Discontinued Slater/Orrison Road

TRAIL SEPARATION FROM HIGHER VOLUME/HIGHER SPEED ROADWAYS

While it's becoming increasingly more popular and desirable to use trails in Loudoun County, the trail network is disjointed and many of the existing roadways lack adequate space, access, and safety for people interested in using trails. Using existing roadways can help make connections and create a more comprehensive network, but improvements are needed to provide a safe, convenient, and comfortable path for these connections. Improvements may include:

- **Building a new sidepath trail** – The safest and most comfortable and attractive path will be separated from the roadway. However, a new path will be more expensive to build and may cause impacts to right-of-way or environmental features. It will also require new drainage accommodations and stormwater management. Careful consideration of existing conditions is necessary to ensure cost-effective and context-sensitive solutions for trail access. Creating a separated side path along one side of the road requires a minimum separation of ten feet. However, the spatial needs of roadside drainage would necessitate a minimum of 52' of right-of-way width (to accommodate a buffer width (10'), pavement width (10'), shoulder width (+4'), and open ditch drainage (+/-28'). This technique would

be needed where operating speeds cannot be slowed to 35 mph and where traffic volumes are likely to increase in response to anticipated future development.

- **Roadway reconfiguration (also referred to as “Road Diet”)** – Some roadways today may have extra lane width or excess lane capacity allowing for an opportunity to change striping and add in new dedicated pathways or buffered lanes for pedestrian and bicycle users. Restriping roadways can achieve traffic calming and create new, safe spaces for people walking or biking. However, traffic analysis may be required to ensure new roadway capacity is adequate, and minimum standard lane widths should be maintained.
- **Widening roadway surface to add bikeable and/or walkable shoulders** – can be applied to roadways with lower volumes and speed limits that are less than 35 mph. Current lane widths are typically nine- to eleven-feet. Widening the pavement width would also require modifications to the roadside drainage (either swales or sheet flow to a vegetated buffer strip).

These techniques could be utilized on the following routes (where speed limits are posted or could be posted at 35mph or less)

- Mountain Road
- Taylorstown Road (with accommodations for bridge crossing)
- St. Claire Lane (requires rural traffic calming to maintain lower operating speeds)
- Lost Corner Road
- Balls Bluff Road

ROADWAY CROSSINGS

In areas where pedestrian and bicycle paths cross roadways, it’s important to consider roadway safety features to make crossing safer. Increasing driver expectation of the potential for people crossing is important, and this can be done by increasing visibility of people crossing. There should be well-marked crosswalks and lighting at all trail crossings. Additionally, to provide adequate time for people to cross, consider using dedicated pedestrian signals, leading pedestrian intervals, and Rectangular Rapid Flashing Beacon (RRFB) sometimes referred to as High-Intensity Activated Crosswalk (HAWK) signals to alert and stop drivers when people are ready to cross.

Traffic Calming – Slowing down speeding cars along busy rural roads can make people biking or walking feel more comfortable along roadways. Speed reduction signing may help, but more intuitive design features can be more effective. Traffic calming may include lane narrowing, horizontal deflections (such as chicanes and splitter islands), turn calming at intersections,



Figure 35 Textured pavement warning strips with spacing that decreases approaching Upperville with introduction of flush curb to signal to drivers to slow down

vertical delineators (such as flex posts and bollards), radar activated speed signs, textured pavement warning strips approaching communities, community entrance features and narrowing the drivers viewshed (such as adding an allée of street trees and other landscaping).

An example of how this can be designed within the corridor already exists at US 15 near Tuscarora High School where there is already good trail infrastructure with a separated path, highly-visible crosswalks, and pedestrian signals. Additional traffic calming, lighting, and wayfinding can be added to improve the trail comfort and safety in this area.

Where the trail needs to cross major roadways, efforts are needed to:

- shorten the crossing distance utilizing curb extensions where applicable
- mark all four segments of a signalized intersection with high visibility crosswalks (ladder or continental type)
- reduce the operating speeds of turning vehicles by tightening the turning radii and using protected medians to limit left turning movements from cutting into the safe crossing area
- Provide appropriate warning and advisory signs in advance of all crosswalks and pedestrian areas
- For mid-block crossings on higher volume roads utilize RRFB signalization accompanied by a pedestrian refuge island and high visibility crosswalks to accommodate high volume trail use



Figure 36 Existing trail infrastructure at US 15 near Tuscarora High School (Source: Google Street View)

areas

BRIDGE CONNECTIONS

Potential Potomac River Crossing Improvements

For each of these existing bridge crossings, there is inadequate

space for pedestrian and bicycle access. However, there is potential to add a parallel structure as either a cantilever addition to the current bridge or a new separate structure for trail users.

Option 1: Cantilever Bridge Addition

A new cantilever bridge could be added to the existing bridge structure to extend outward making use of the existing structure's height and support while adding a pathway for walkers and cyclists. The cantilever section would be supported by a series of strong, steel arms or beams, each extending from the main bridge's structure at various points, creating a safe, elevated pathway.

The cantilever bridge itself would likely be made of steel or reinforced concrete, designed to minimize weight while ensuring strength and durability. The deck of the cantilever bridge would be wide enough to comfortably accommodate the trail meeting AASHTO and ADA standards. Instead of relying on traditional vertical supports like piers, the cantilever bridge uses the tension in the beams and arms to hold the weight.

Any improvements or modifications to these bridges would need



Figure 37 Existing cantilever bridge over the Potomac River along the Appalachian Trail near Harper's Ferry, West Virginia (Source: Google Street View)

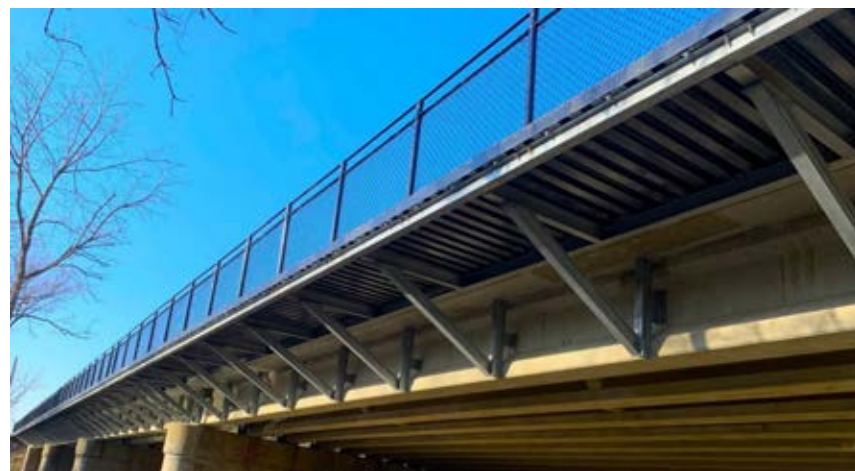


Figure 38 Substructure view of Cass Avenue Bridge in Clinton, Michigan, A typical cantilever structure for an added trail along a pre-existing roadway bridge (Source: Creative Composites Group Cass Avenue Bridge Cantilever Sidewalk)

Figure 39 Street level view of Cass Avenue Bridge in Clinton, Michigan (Source: Creative Composites Group [Cass Avenue Bridge Cantilever Sidewalk](#))

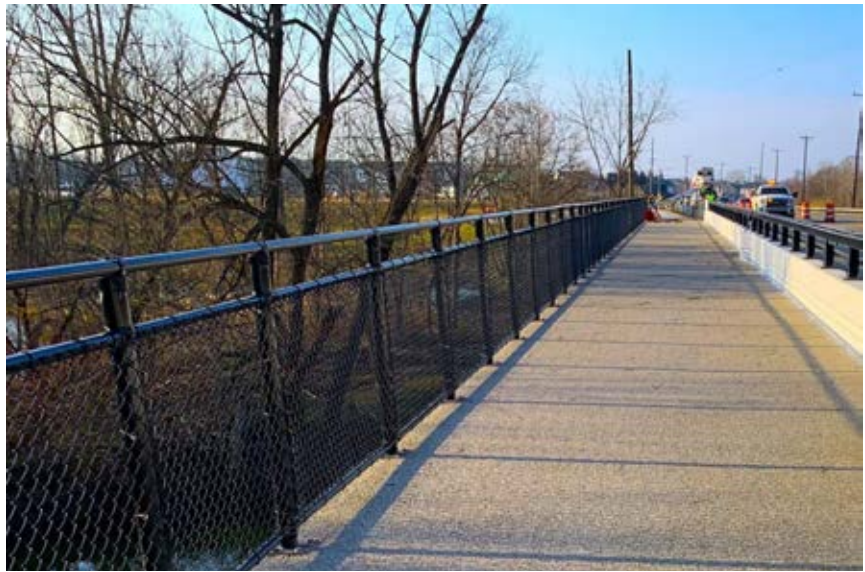


Figure 40 The Singing Bridge in Frankfort Kentucky is a historic truss bridge structure with an added cantilever bridge trail along the side for safe pedestrian and bicycle access. (Source: Google Street View)



Figure 41 A parallel and separate prefabricated pedestrian bridge adjacent to a roadway bridge.





Figure 42 Bridge Columbia in Columbia, Maryland is a custom, signature bridge structure designed for pedestrian and bicycle access only.

to be coordinated with the State of Maryland as the owner of all roadway bridges crossing the Potomac River. A structural analysis will also be required to ensure the existing bridge substructure can accommodate the added weight of a new cantilever extension. Careful attention would be necessary to ensure the new cantilever structure would connect seamlessly to the existing bridge at strategic points, using steel connections, bolts, or welds to ensure stability. Bridge hydraulics and drainage systems would also need to be accounted for.

Additional trail linkages and new paving would also be required leading up to and off of the bridge structure to create a connected network, which may also incur additional right of way impacts, environmental permitting requirements, stormwater management, and costs. Lighting may also be added for nighttime visibility.

The cantilever bridge could be designed to complement the existing bridge structure, with careful attention paid to making the new structure look like an integrated part of the whole. The new cantilever extension could be painted to match the existing bridge, or it could use materials that blend naturally with the environment. The bridge may also offer dramatic views providing a scenic vista over the Potomac River for trail users.

Option 2: New Parallel Bridge

If a new cantilever bridge is not feasible, another option is to build a new separated structure for pedestrian and bicycle access across the Potomac River. This would provide an attractive new bridge offering unique views over the Potomac River, and could make a more direct connection to specific destinations in Maryland. However, it would also be at a much higher cost and cause greater impacts to right-of-way and environmental features with new abutments, piers, and landside trail connections.

Aligning a new bridge close to an existing bridge may reduce some right-of-way impacts, but the environmental impacts and associated permitting requirements are unavoidable. The bridge may be prefabricated or custom built.

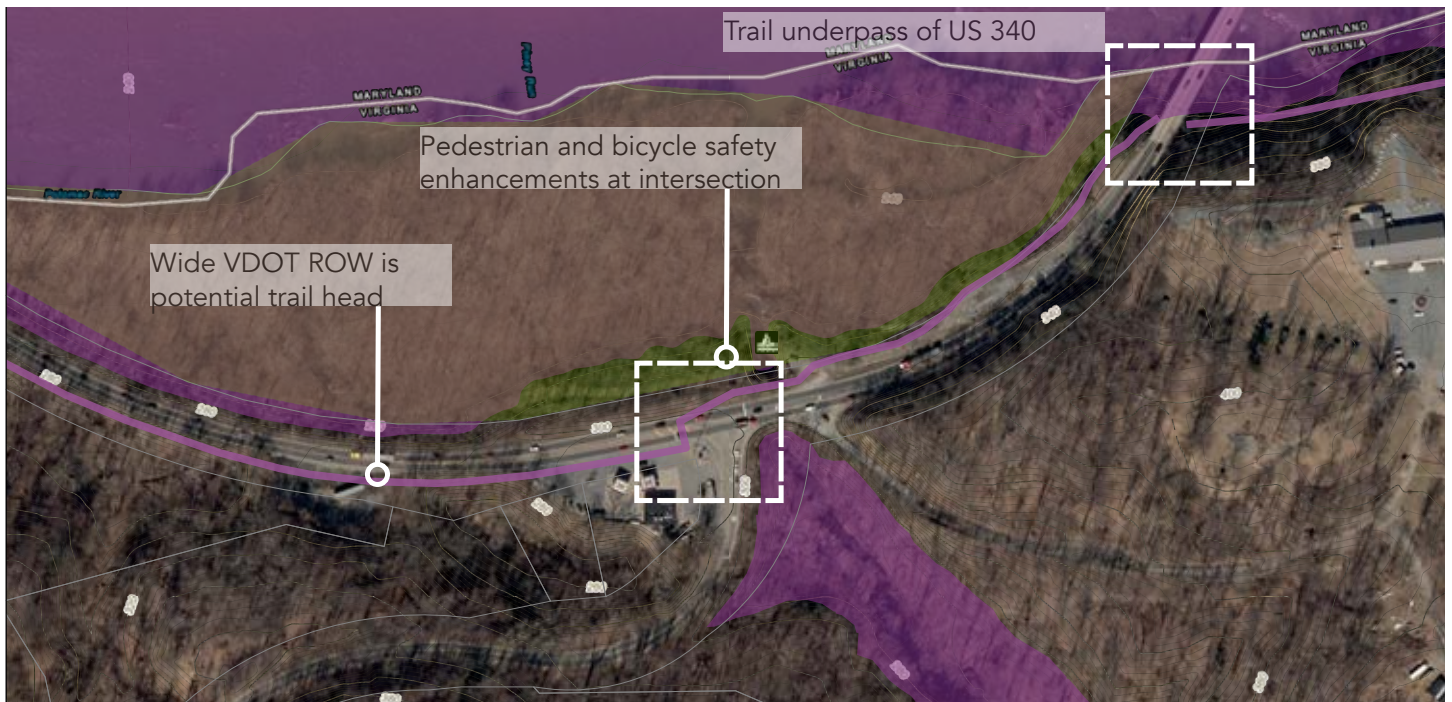
SAFETY IMPROVEMENTS

Several key locations along the proposed Potomac Heritage National Scenic Trail corridors will require improvements to accommodate safety of trail users along roadways. These include:

US 340 at Harpers Ferry Road

This area is located at an existing, signalized, three-legged intersection, with an adjacent convenience store and gas station on the southwest corner and the Potoma Wayside located on the northern side. There is no shoulder or path for trail users, and posted speeds are 45 mph making lane sharing unsafe. Right-of-way associated with the Potoma Wayside on the north side and between the convenience store and the Loudoun Heights trailhead on the south side are both sufficient to accommodate a new pathway. Feasibility is limited by adjoining watercourses and steeply sloping embankments that may require

Figure 43 Enhancements to US 340 at Harpers Ferry Road (approaches and intersection)



LEGEND	USA Flood Hazard Areas	Index Obscured	High Resolution 60cm Imagery	
<ul style="list-style-type: none"> Limited Feasibility Parks NVRC Hand Carry Boat Launches 	<ul style="list-style-type: none"> 1% Annual Chance Flood Hazard Topography 4ft Index Intermediate 	<ul style="list-style-type: none"> Intermediate Obscured/Null World Imagery Low Resolution 15m Imagery 	<ul style="list-style-type: none"> High Resolution 30cm Imagery Citations 60cm Resolution Metadata 	

Loudoun County, Virginia, County of Loudoun, VITA, Esri, HERE, Garmin, IPC, County of Loudoun, Maxar

engineered solutions to accommodate a trail. Reducing lane widths to increase shoulder width and/or creating a separated, protected trail path can help reduce impacts and costs. This could be designed as part of the roadbed and separated from traffic with a precast monolithic median, bollards, and/or flexposts. Additionally, new crosswalks, lighting, and pedestrian signals added at the intersection with Harpers Ferry Road can help improve safety and comfort for people crossing.

Berlin Turnpike

The Berlin Turnpike (VA 287) has two through lanes and minimal shoulder widths and a rolling, curving character without long, open straight segments. There is no path for trail users, and posted speeds are 45 mph making lane sharing unsafe. In some areas, topography is favorable for a new trail with adequate roadside space. However, there is overall limited right-of-way, streams, forests, and sloped topography make adding a new trail more difficult along the roadside but an important investment in making a connected trail network. Reducing lane widths to increase shoulder width and create a separated, protected trail path can help reduce impacts and costs. This could be designed as part of the roadbed and separated from traffic with a precast monolithic median, bollards, and/or flexposts.

Taylorstown Road

Taylorstown Road (VA 668) is a narrow, winding, two-lane rural roadway through the rustic countryside and historic village center of Taylorstown. It's posted speed limit is 35 mph making lane sharing feasible, but not comfortable for most trail users. This is a low volume road and in some areas, there is no striping and some areas has a double yellow centerline only. Changing the



Figure 44 Example of cantilevered trail on shoreline of Colorado Riverway Trail near Moab, UT

striping to “Advisory Bike Lane” pattern can designate space for all users to share separately, allowing for some lane shifts when two users pass.

US 15 at Lovettsville Road

This area is where two highways come together at sweeping curve limiting sight distance. There is no shoulder or path for trail users, and posted speeds are 45 mph making lane sharing unsafe. Limited right-of-way, streams, forests, and sloped topography make adding a new trail more difficult along the roadside but an important investment in making a connected trail network. Some older roadbed along the inside curve can be repurposed for a trail facility. Reducing lane widths to increase shoulder width and create a separated, protected trail path can help reduce impacts and costs. This could be designed as part of the roadbed and separated from traffic with a precast monolithic

Figure 45 Example Advisory Bike Lane (with on street parking) where bike paths are delineated and low volume, two-way traffic shares roadway space. If two cars come to pass, they may merge into bike lanes when they pass.



Figure 46 Example roundabout with separated, dedicated space for pedestrian, bicycles, and vehicles (Source: Car Free America)



median, bollards, and/or flexposts. Additionally, new crosswalks, lighting, and pedestrian signals added at the intersection with Lovettsville Road can help improve safety and comfort for people crossing.

US 15 at Lucketts

James Monroe Highway (US 15) at the junction of Stumptown Road (VA 662) changes character as it passes through the small village of Lucketts. Within the village area, a road diet with bike lanes and new sidewalks is appropriate for residents, visitors, and trail users of Lucketts to be able to walk or bike safely. Traffic calming and crosswalk improvements are also necessary at the main roadway junction of James Monroe Highway and Stumptown Road.

US 15 at Montresor Road

There is a planned roundabout at this junction (Figure 12 on page 7), which will have a great benefit for traffic calming and traffic operations. However, standard roundabouts often create difficult crossings for pedestrians and cyclists given the free-flowing traffic operation. Motorists should yield to pedestrians, and creating dedicated pathways and high-visible crossings for pedestrians and bicycles will be important (Figure 46 on page 66).

Battlefield Parkway Overpass to Balls Bluff Road

In Leesburg, the character of the landscape is much more urban than the northern areas of Loudoun County, and roadway typologies are also different. Battlefield Parkway is an important trail connection along a busy, collector highway. Several large intersections crossing multiple lanes of traffic makes it difficult for trail users to connect. Traffic calming and road diet improvements can help to slow traffic. Median refuge islands, highly-visible crosswalks, lighting, and pedestrian signals at all crossing are important safety features to include with new roadway improvements. A Pedestrian HAWK signal at Balls Bluff Road can also help improve safety for people crossing at this unsignalized intersection.

Edwards Landing Trail

The Edwards Landing Trail crosses Edwards Ferry Road mid-block apart from any controlled intersection, and drivers may not yield or expect trail users to be crossing. Traffic calming and road diet improvements can help to slow traffic. Median refuge islands, highly-visible crosswalks, lighting, and pedestrian signals at all crossing are important safety features to include with new roadway improvements. A Pedestrian HAWK signal can also help improve safety by alerting drivers to yield.



Figure 47 Lucketts approaching US 15 on Lucketts Road, heading west

Cultural Resources

The PHNST in western Loudoun is rich in potential cultural resources as noted in the Assessment. Mapping Potential conditions related to a trail within close proximity to historic structures, cultural landscape features or archaeological areas should be identified early in the design process to ensure the trail alignment will be sensitive to and avoid locations of significant resources. An initial Phase One Cultural Resource Survey will be helpful in further narrowing down the footprint of any potential resources.



Figure 48 Example of bench cut trail in Fountainhead Park (NOVA Parks)

SUSTAINABLE TRAILS USING CONTEXT SENSITIVE DESIGN

Establishing baseline design principles for each trail segment, be it an improvement to an existing trail or the development of a new trail, establishes the foundation for long-term sustainability of the trail system. Sustainable trail design minimizes impact to Potomac River resources and provides a safe and enjoyable experience for PHNST visitor.

In coordination with Loudoun County, these principles should be considered part of the trail design program and assumed for use in all trail development along the PHNST.

Trail Location

For future natural surface trails that are part of the PHNST in western Loudoun, trails should be located above the 500-year floodplain as a hedge against future changes in rainfall intensity and duration.

In many cases the 500-year floodplain is defined by the steeply sloping escarpment of the Potomac River. To the extent practical and where cooperative agreements can be established with private owners and other agencies, the trail should be located along these sidehills at the base of the escarpment or at midslope. Sidehill design makes it easier to manage runoff so it does not flow down the trail. Trails located in bottomlands or on level ridgetops are prone to ponding leading to trail widening to avoid the ponding.

Trails on sidehills should be constructed using a full bench cut to provide the best foundation for trail use.

Trail Alignment

Sustainable trails traverse slopes rather than directly descending a hill side. A trail traversing a slope allows for sheet runoff of stormwater, which will cause less erosion and minimize the creation of gullies.

Trails that are within 0-22 degrees of parallel to the contour are usually the most sustainable, with 23-45 degrees acceptable with proper use of rolling grade dips and other methods of shedding water off the trail.

Trail Profile

A trail with a profile grade of less than 5% will be usable by the widest range of ages and abilities. If feasible, at least 70% of the trail should have a profile grade of less than 5%, consistent with the Architectural Barriers Act which provides accessibility guidance for recreational trails.

Where a 5% profile grade would result in environmental impacts,

trail profile grades can be used up to 12%. These steeper sections should include resting areas (one five foot level area every 200 feet for slopes less than 8% and more frequent for steep profiles).

Trails steeper than 12% in profile but less than 15% can be used where necessary but for no longer than 30 feet in length.

Grade Reversals

A grade reversal is a brief change in elevation where the trail drops subtly before rising again. Sometimes referred to as rolling grade dips, incorporating the use of grade reversals in trail design will keep water from running down the trail and minimize the potential for erosion. Grade dips can also be used to shed water and is a smaller version of a grade reversal or rolling grade dip. Grade reversals or grade dips should be installed for every five feet of elevation gain to ensure that water does not run down the trail

Trails should be built with a slight tilt or outslope (about 2-5%) of the trail tread toward the low side of the trail. Where outslope is difficult to implement, the use of grade reversals should be considered.

Stream and Wetland Crossings

Generally, trail alignment should be outside of any identified buffer zones around sensitive natural resources and cultural resources. When crossing sensitive areas, crossing points should be established at the narrowest point in the tributary stream or wetland, including the buffer. Loudoun County's River and Stream Corridor Resources (RSCS) should be utilized as the basis for defining adequate buffers around sensitive natural resources.

Stream crossings should be designed and constructed on a gentle grade at no greater than a 5% profile grade. Gradually sloping stream banks on which to locate the crossing is recommended to minimize impact. Trails should not parallel a stream for an extended distance. If the trail should need to travel along a waterway, the trail should be aligned in a manner that it moves toward and away from the waterway at intervals that are determined appropriate for the size of the river or stream and the existing riparian habitat conditions. Boardwalk crossings for streams should span the channel of the stream and any boardwalk posts or fill should be kept above the ordinary high water mark of stream channels.

If a trail is constructed within a wetland, a boardwalk system is recommended. The boardwalk design should provide a layout that minimizes the width of the boardwalk tread, the number and size of pilings needed for excavation and the use of best practices that minimize the size of excavation.



Figure 49 Example of single track boardwalk built to preserve sensitive natural features at Silver Lake Preserve, NY (The Nature Conservancy)



Figure 50 Example of top down construction for boardwalk construction

Additionally, trail or boardwalk construction in or near wetlands should consider the following practices to minimize impacts to aquatic resources:

- Use a top-down method of construction, building one section of trail from the previously constructed section so that mechanical equipment will not compact the wetland areas.
- Use construction matting to provide access to the bridge and boardwalk areas so that any construction equipment will not further compact adjoining soils and sensitive vegetation
- Consider longer spans with stronger structural members to minimize impact of pile driving
- Construct during winter if feasible

Sustainable trails typically require less maintenance and fewer resources to maintain the intended use. Maintenance of trails should work to keep original trail design features and use sustainable techniques to respond to problem areas.

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